REPORT

OF THE

MEDICAL SERVICES, MINISTRY OF HEALTH

REPUBLIC OF THE SUDAN

FOR THE YEAR

1958/59

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Chapter I

INTRODUCTION

The general health conditions were maintained at a satisfactory level in spite of the diversity of the problems that were to be faced. No major epidemic of the quarantinable diseases was encountered. Cerebro-spinal Meningitis occurred sporadically in all provinces especially Bahr El Ghazal province and here the incidence showed a marked decrease as compared with last year. Small-pox has also occurred sporadically in various parts and in some cases infection was proved to be a local one. This shows that the disease is establishing itself in certain focii, but the continuous vaccination being carried out yearly greatly minimize the danger of a big flare up.

On the endemic side Kala-Azar has been the problem of the year. Incidence has shown a marked increase in spite of previous years' efforts and so more qualified personnel were put in the field and complete case finding survey was carried out in the endemic areas of Upper Nile and Blue Nile Provinces In addition to treatment, preventive measures were carried out.

However, it became apparent that more research is required to gain more knowledge about the epidemiology of the disease, the vector, its habits, any possible animal reservoirs and their types. So the help of the NAMRU 3 " Research Unit of the American Navy " in Cairo was sought and they kindly agreed to establish a sub-unit at Malakal for the purpose which has already started its work. Meanwhile the treatment centres are continuing their mission in the endemic zone.

Efforts of control of Malaria, Bilharzia and Venereal diseases have continued and it is felt that without such measures the effects of these diseases would have been a menace.

The combat of sleeping sickness by Lomidine protection was carried out and it has shown its effect on lowering the incidence. Mass vaccination against Yellow Fever was done along the Sudan—Congo border on receipt of information revealing incidence of the disease in the Congo. 50,000 persons were inoculated.

School children and mothers and infants received their share of care. 2 more Health Centres were added to the list and a complete medical examination was carried out in all schools followed by the treatment of diseases discovered.

W.H.O. Assisted Projects

B.C.G. Vaccination : The team continued its work in the Southern provinces having tested 269,097 persons and vaccinated 105,414. The work in that area is nearly finished.

T.B. Pilot Project : The Educational, preventive and curative activities of this centre have continued. A number of Medical Assistants, Public Health Officers, Sanitary Overseers and Medical Officers have received training on the methods of combatting tuberculosis. T.B. Home visitors have been trained. In addition a prevalence survey was carried out in the area round the centre to determine the extent of tuberculous infection.

Malaria Pilot Project This work has continued, covering now the whole project area of 78,044 Kilometers with a population of 592,588. It is now in the phase of consolidation and evaluation, and certain encouraging results have come to light. This will play a major role in the anticipated major programme of eradication in the country. This centre has also provided a good chance for training of Public Health Officers and junior staff in the work of Malaria Control.

Nursing College. 6 girls graduated during this year as Nursing Sisters and the school is functioning well.

Blood Bank : This project is progressing well. Buildings are now available, equipment is coming in and it is hoped the work will start soon.

UNICEF Assistance

This Organization is extending appreciable help to Child Welfare Centres and nursing schools (junior). Food, equipment and transport are being supplied. There are 34 Centres and 8 Nursing and Midwifery Schools which are assisted in this manner. Its help was also extended to the Tuberculosis and Malaria projects.

Fellowships

The following candidates were awarded study courses during the year.

Name	Nature of Study	Country
Dr. El Hadi El Zein	Gnyaecology and Obstetrics	U.K.
Dr. Zein El Nayal	Gynaecology and Obstetrics	U.K.
Dr. Fayez Amin El Sunni ...	M.R.C.P. Examination	U.K.
Dr. Ibrahim Saleh El Maghrabi ...	M.R.C.P. Examination	U.K.
Dr. Abu Bakr Mohed. El Amin ...	M.R.C.P. Examination	U.K.
Dr. Ahmed Abdel Aziz	Primary F.R.C.S.	U.K.
Dr. El Tahir Fadol	Anaethesia	U.K.
Dr. Abdel Ghani Farah Salih ...	Anaethesia	U.K.
Dr. Mahmoud A/Rahman Ziada ...	M.R.C.P. Examination	U.K.
Sayed Abdel Hamid Ibrahim ...	Environmental Sanitation and Drug Control	London Geneva and Alexandria

Some 27 visitors from W.H.O. and various other countries visited the Sudan either in connection with the above-mentioned projects or on fellowship study tours.

10 delegates from the Ministry of Health have attended the following Conferences or Seminars.

Name	Conference	Date
Dr. Taha Ahmed Baasher	Eleventh Annual Meeting of the World Federation for Mental Health at Vienna	24th — 29th August, 1958
Dr. Mohammed Hamad Satti ...	Sixth International Congress of Tropical Medicine and Malaria at Lisbon	5th — 13th September, 1958
Dr. A. O. Abu Shamma	Sub-Committee 'A' of the Eastern Mediterranean Region, W.H.O. at Baghdad	12th — 18th October, 1958
Sayed Khalafalla Babikir El Bedri Sayed Mustafa Ahmed El Baroudi	Seminar on Health Education of the Public at Tehran	28th Oct. to 9th Nov., 1958.
Dr. El Hadi El Nagar	F.A.O. Regional Conference at Damascus	10th to 20th December, 1958
Dr. Mansour Ali Haseeb	Virus and Rickettasial Diseases at Pasteur Institute, Conoor, India	6th — 22nd December, 1958
Dr. Abbas Hamad Nasr	Leprosy Conference at Brazzaville ...	14th — 21st April, 1959
Dr. A. O. Abu Shamma	12th World Health Assembly, Geneva	12th — 30th May, 1959
Dr. Hassan El Hakim	Arab Medical Conference at Damascus	16th — 20th June, 1959

CHAPTER II.

ADMINISTRATION

(a) STAFF AND FUNCTIONS

Table I shows the establishment of classified staff. Some categories o professional and technical staff were still under establishment. The table inclu des officials serving an secondment with Local Government Authorities.

PERSONNEL

Table I

Statistics of Classified Staff Establishment covering the period 1.7.1958 to 30.6.1959 :—

Category	Establishment	
	Sudanese	Expatriates
Headquarters		
Director	1	—
Deputy Director	1	—
Asst. Director (Public Health) and Curator of the Graphic Museum	1	—
Asst. Director (Hospitals)	1	—
Deputy A. Director (Public Health)	1	—
Deputy A. Director (Hospitals)	1	—
Chief Public Health Inspector	1	—
Senior Establishments Officer	1	—
Inspector of Administration	1	—
Establishments Officer	1	—
Principal School of Hygiene	1	—
Principal Matron	1	—
Asst. Principal Matron	1	—
Head Staff Clerk	1	—
Secretary to Minister of Health	1	—
Staff Clerk	4	—
Senior Clerk	10	—
Clerk (including Nursing College and T.B.T. Centre)	23	—
Junior Clerk (including Minister of Health Office)	8	—
Finance Branch		
Controller of Accounts	1	—
Inspector of Accounts	1	—
Head Accountant	1	—
Accountant	4	—
Senior Book-Keeper	4	—
Book-Keeper	19	—
Junior Book-Keeper	3	—
Stores Section		
Controller, Medical Stores	1	—
Asst. Controller, Medical Stores	1	—
Supt. of Stores	2	—
Stock Verifier	1	—
Senior Store-Keeper	3	—
Store-Keeper	18	—
Store-Keeper Under Training (Northern) Hospitals	10	—
Junior Store-keeper	8	—
Telephone Operator	1	—
	138	—
Hospitals and Dispensaries		
Senior Physician and Director Khartoum Hospital	1	—
Senior Surgeon	1	—
Senior Obstet. and Gynaecologist	1	—
Senior Ophthalmologist	1	—
Senior Psychiatrist	1	—
Physicians (including Chest Physician—3)	10	1
Surgeons (including E. N. and T.)	3	8
Psychiatrist	1	—
Radiologist	1	—
Anaesthetist	—	2
Gynaecologist	6	1
Ophthalmologist	7	2
General Duty Doctors (including study courses)	119	40
House Officers (Housemen)	42	—

Category	Establishment	
	Sudanese	Expatriates
Senior Dental Surgeon	1	—
Dental Surgeon	2	3
Dental Officer	2	3
Dental Mechanic	—	2
Dental Mechanic Trainee	3	—
Pharmaceutical Registrar	—	1
Pharmacist	2	—
Lady Administrator	1	—
Supt. Radiography	—	1
Clinical Pathologist	—	1
Senior Dispenser	5	—
Dispenser	21	—
Dispenser Under Training	6	—
Senior Radiographer	2	—
Radiographers	21	—
Asst. Radiographers U.T.	18	—
X-Ray Technician (T.B. Training Centre)	2	—
Hospital Manager	5	—
Dark Room Technician	1	—
Electrical Engineer	—	1
Laboratory Technician	—	3
Senior Medical Assistants	15	—
Medical Assistant	491	—
Mental Health Assistants	2	—
Ophthalmic Assistant	7	—
Refractionists	17	—
Senior Nursing Instructor	2	—
Nursing Instructor	33	—
Theatre Attendant	67	—
Head Mumarrid	50	—
Senior Clerk	8	—
Clerk	30	—
Junior Clerk	16	—
Card Clerk (New K.H.)	1	—
Senior Book-Keeper	14	—
Book-Keeper	23	—
Junior Book-Keeper	37	—
Senior Store-Keeper	2	—
Store-Keeper	15	—
Asst. Store-Keeper (Ex-Ration Clerk)	46	—
Store-Keeper U.T. (Southern Hospitals)	10	—
Telephone Operator	6	—
Quarantine Overseer	2	—
Southern Trainee	10	—
Nursing Staff		
Matron Khartoum Hospital	—	1
Matron Omdurman Hospital and N.T. School	—	1
Hospital Matrons W/Medani, Port Sudan, Fasher, Juba, Obeid and Atbara	4	2
Asst. Matron-in-charge sisters	9	8
Physiotherapist	—	6
Senior Nursing Sister	19	—
Nursing Sisters (Expatriate)	—	23
School Hostess (Nursing C.)	1	—
A/Nursing Sister (Sudanese)	29	—
Dietician Sister (New Khartoum Hospital)	—	1
Theatre Sister (New Khartoum Hospital)	—	1
Sister Tutor (New Khartoum Hospital)	—	2
Ward Sister (New Khartoum Hospital)	—	17
Nurse U. T. Abroad	2	—
	1254	131

Category	Establishment	
	Sudanese	Expatriates
PUBLIC HEALTH		
Province Medical Officer of Health	11	—
Asst. Province Medical Officer of Health	9	—
Woman Doctor	1	—
Senior Public Health Inspector	11	—
Public Health Inspector	12	—
Port Health Officer	1	—
Public Health Officer	51	—
Principal M.T. School	—	1
Principal H.V.T. School	1	—
Asst. P.H.V.T. School	1	—
Asst. P.M.T. School...	1	—
Health Visitor	19	—
Senior Staff Midwife	6	—
Staff Midwife	16	—
Asst. Supt. Nursing Officer	2	—
Senior Health Visitor	6	—
Supt. M.T. School	6	—
Supt. Nursing Officer	8	4
Senior Sanitary Overseer	1	—
Sanitary Overseer	153	—
Public Health Student Under Training	35	—
Senior Clerk	1	—
Clerk (including T.B. campaign)	6	—
Junior Clerk	12	—
Junior Book-Keeper	1	—
	371	5
RESEARCH AND LABORATORIES :		
(a) *Stack Medical Research* :		
Asst. Director Research	1	—
Bacteriologist	—	1
Pathologist	—	1
Registrar	1	—
Supt. Laboratory	—	1
Laboratory Technician	7	1
Laboratory Technician Trainee	8	—
Senior Laboratory Assistant	12	—
Laboratory Assistants	69	—
Head Laboratory Attendant	2	—
Junior Technical Assistant...	1	—
Senior Clerk	1	—
Clerk	1	—
Junior Clerk	1	—
(b) *Chemical Laboratories* (*W.C.L.*)		
Government Analyst	1	—
Asst. Government Analyst	3	—
Scientific Officer Under Training	2	—
Senior Technical Assistant	2	—
Technical Assistant	5	—
Junior Technical Assistant...	3	—
Clerk	1	—
Library Clerk	1	—
(c) *Medical Entomology* :		
Medical Entomologist	—	1
Asst. Scientific Officer Under Training	1	—
Entomological Technician	1	—
Technical Assistant	1	—

Category	Establishment	
	Sudanese	Expatriates
Junior Technical Assistant...	2	—
Junior Clerk	1	—
(d) *Schistosomiasis*:		
Biologist	—	1
Senior Technical Assistant	1	—
Technical Assistant	1	—
Clerk	1	—
Store-Keeper	1	—
	132	6

Section	Establishment	
	Sudanese	Expatriates
Graphic Museum		
Asst. Curator...	1	—
Technical Assistant	1	—
Museum Attendants...	1	—
Total	3	—

SUMMARY OF CLASSIFIED STAFF

Section	Establishment	
	Sudanese	Expatriates
Headquarters	138	—
Hospitals and Dispensaries	1254	131
Public Health	371	5
Stack Medical Research	104	4
Chemical Analytical Section	18	—
Medical Entomology	6	1
Schistosomiasis	4	1
Graphic Museum	6	—
Grand Total	1,901	142

Unclassified Staff excluding casual labour numbered 8,073 approximately.

PHYSICIANS ETC. PRACTISTISING IN THE SUDAN

Occupations	Government Officials Serving in M.H.	Private Practice
Physicians (including Chest Physicians)	12	85
Surgeons	12	—
Obstet. and Gynaecologists	8	—
Ophthalmologists	10	—
Psychiatrists	2	—
Radiologists	1	—
Anaesthetist	1	—
General Duty Doctors	159	—
Dentists	10	28
Pharmacists	3	43
Dispensers	27	—
Medical Assistants	506	—

(b) LEGISLATION

The following legislations were enacted during the year :—

(1) THE MEDICAL COUNCIL ORDINANCE

(Second Amendment, 1957)

(1957 P.O. No. 4) Confirmed and became (1958 Act No. 1)

(2) THE POISONS ORDER (AMENDMENT No. 2), 1958

(1958 L.R.O. No. 16)

The Central Board of Public Health, in exercise of the powers conferred upon it by Section 23 of the Pharmacy and Poisons Ordinance, 1939, hereby makes the following amendment in the Poisons List :—

In part 1, the following items shall be added :—

1—(2—Morpholincethy) — 4—Phenylpiperidine.

4—Carboxylic acid, ethyl ester, (morpheridine), its salts, d—3—methyl —2, 2—diphenyl—4—morpholino-butyryl-pyrrolidine (dextromoramide), its salts.

db—3 methyl—2, 2-diphenyl 1—4— morpholino-butyryl-pyrrolidine (racemoramide), its salts ;

1—2—(2—hydroxyethoxy) ethyl—4—phenylpiperidine—4—carboxylic acid, ethyl ester (etoxaridine), its salts ;

1,2, 5—trimethyl—4 phenyl—4 propioroxypiperidine (trimeperidine), its salts ;

1—3—methyl—2, 2—diphenyl—4 morpholino—butyryl—pyrrolidine (levomoramide), its salts.

(3) THE POISONS ORDER (AMENDMENT), 1958

(1958 L.R.O. No. 24)

The Central Board of Public Health, in exercise of the powers conferred upon it by Section 23 of the Pharmacy and Poisons Ordinance, 1939, hereby makes the following amendment in the Poisons List :—

In Part I, the following Items shall be added :—
Normethadone.

(c) FINANCE

Table II (A)

Income and Expenditure of the Ministry of Health over the Last 4 Years

	1955/6	1956/57	1957/58	1958/59
	LS.	LS.	LS.	LS.
Revenue	46,854	52,184	64,061	78,552
Expenditure :—				
Personnel	1,527,891	1,687,799	1,926,034	1,986,588
Services	1,371,759	1,404,318	1,753,318	1,686,864
Extra-ordinary	10,413	23,696	20,173	13,486
Total	2,910,063	3,115,813	3,699,525	3,686,938

Table II (B)

Analysis of Expenditure of the Ministry of Health for 1958/59 *from* 1.7.1958 *to* 30.6.1959

Section	Personnel	Services	Extra-ordinary	Total
	LS.	LS.	LS.	LS.
Headquarters	100,198	407,286	13,486	520,970
Hospitals	1,604,915	1,103,724	—	2,708,639
Hygiene and Public Health... ...	211,312	164,810	—	376,122
Research	68,466	11,044	—	79,510
Graphic Museum	1,697	—	—	1,697
Seconded Staff	—	—	—	—
Total	1,986,588	1,686,864	13,486	3,686,938

REMARKS :—

1958/59 figures are based on actual expenditure up to 31.5.1959 plus estimated expenditure to end of June 1959.

CHAPTER III

PUBLIC HEALTH

(a) HEALTH OF OFFICIALS

TABLE III

NATIONALITY	Number of officials employed	TOTAL		Average days sickness		Died	Invalided
		Number placed on sick list	No. of days sick	For all officials	For those who were sick		
Sudanese	13,267	3,072	22,599	1.70	7.36	6	6
Non-Sudanese ...	596	64	350	.60	5.49	—	—

(b) GENERAL HEALTH

WORK DONE IN HOSPITALS AND DISPENSARIES

In spite of the financial stringency, it was possible to expand the services in an appreciable manner.

The building of the following hospitals has been completed :—

	No. of Beds
Khartoum Chest Hospital (El Thawra)	200
Raga Hospital	40
Rigl El Fula Hospital	60
Bentui Hospital	100
Renk Hospital	60
Um Ruaba Hospital	60
Daien Hospital	60
Tonj Hospital	60

Of the above hospitals, Raga and Rigl El Fula hospitals were opened for work during the year and the rest will operate soon.

The following additional hospitals were approved and are under construction :—

Buram Hospital

Delgo Hospital

Abu Hamad Hospital

Borgeig Hospital

These will when finished add 240 beds to the total beds in hospitals.

Lui Hospital formerly run by the Missionary Societies was taken over by the Ministry of Health.

Other buildings that were approved for the year appear in the following list. They include wards which increase the bed accommodation in existing Hospitals by 294 beds.

Province	Locality	Buildings Erected
Bahr El Ghazal ...	Wau	Female 20 bedded T.B. Ward.
	,,	Additions to T.B. Ward — 8 beds.
	Rumbek	Lecture Room.
	Aweil	Isolation Bloek — 8 beds.
Blue Nile ...	Kosti	Maternity Ward — 16 beds.
	Rufaa	House for Medieal Officer.
	,,	4 Class II houses for Hospital Staff.
	Medani	2 Wards 24 beds each — one for eyes and one general female.
	,,	New Theatre Block
	,,	Speeialist Out-Patient Dept.
	Dueim	16 bedded Maternity Ward.
	Abu Usher	6 bedded Maternity Ward.
Darfur	Geneina	8 bedded Isolation Block.
	Zalingei	Medieal Assistant's House.
Kassala	Kassala	20-bedded Gynaecological Ward.
	,,	2 10-bedded Children's Wards.
	Gedaref	T.B. Ward 24 beds.
	,,	Isolation Bloek — 8 beds.
	Port Sudan	Out-patient Eye Clinic.
Khartoum ...	Khartoum	Casualty Out-Patient Dept.
	Khartoum North	4 Maternity Block — 12 beds.
	,,	2 T.B. Wards — Male and Female — 24 beds each
Northern	Atbara	Specialist Out-Patient Dept.
	,,	16 bedded Eye Ward.
	,,	16 bedded Gynaeeological Ward.
	Dongola	Medical Assistant's House.
Upper Nile... ...	Renk	Public Health Officer's office.

The Programme of expansion of Dispensary Services included the following additions.

Province	New Dispensaries	New Dressing Stations
Bahr El Ghazal	—	5
Blue Nile	1	13
Darfur	1	2
Equatoria	3	—
Kassala	3	—
Khartoum	2	8
Kordofan	3	14
Northern	3	7
Upper Nile...	4	—
Total	20	49

TABLE IV

Work done in Hospitals and Dispensaries for 10 Years

YEAR	Admissions	Attendances	Operations
1949	151,011	10,186,668	21,327
1950/51 (18 months)	302,526	16,503,371	31,459
1951/52	168,251	12,181,931	26,021
1952/53	164,331	13,966,390	26,114
1953/54	172,675	14,483,366	34,432
1954/55	171,092	16,453,892	38,285
1955/56	154,093	17,694,550	38,287
1956/57	176,716	20,430,070	53,839
1957/58	175,543	21,410,339	50,023
1958/59	216,538	24,730,041	64,556

There were 85 licensed private practitioners working independently during the year under review. The figures of their work do not appear in the above list.

ACTIVITIES OF SPECIAL DEPARTMENTS IN HOSPITALS

Dental Clinics: Work done by this Department in all provinces during the year is as follows:—

No. of Attendances	57,893
Extractions	33,326
Conservations	2,273
Scaling and Gum Treatment	7,974
Minor Oral Surgical Cases	1,296

X-Ray Department—Khartoum: The number of X-Ray Films taken for Out-Patients and In-Patients during the year was 17,230.

Physiotherapy Department at Khartoum Hospital: The number of attendances during the year was 37,991.

(c) VITAL STATISTICS

Below is the estimated population of the Sudan as rendered by the Department of Statistics on 1st. July, 1959.

TABLE V

Approximate Estimation of Population by Provinces

PROVINCE	Men	Women	Children	Total
Bahr El Ghazal	327,000	330,000	493,000	1,150,000
Blue Nile	618,000	623,000	1,049,000	2,290,000
Darfur	381,000	472,000	605,000	1,458,000
Equatoria	281,000	314,000	396,000	991,000
Kassala	319,000	286,000	420,000	1,025,000
Khartoum	174,000	146,000	238,000	558,000
Kordofan	548,000	586,000	825,000	1,959,000
Northern	222,000	284,000	462,000	968,000
Upper Nile	292,000	286,000	413,000	991,000
	3,162,000	3,327,000	4,901,000	11,390,000

Table VI

Estimated Population of Towns of Khartoum, Khartoum North and Omdurman

Town	Men	Women	Children	Total
Khartoum	40,717	25,801	37,185	103,703
Khartoum North and Rural Areas	93,520	83,761	152,865	330,146
Omdurman	39,343	37,039	47,769	124,151

Table VII

Crude Birth Rate : Khartoum, Khartoum North and Omdurman

Town	No. of Registered Births	Crude Birth Rate
Khartoum	4,084	39.1
Khartoum North and Rural Areas	5,981	18.1
Omdurman	4,764	38.4

These figures show the work done by licensed midwives only. It is a fact that many births are attended by unlicensed midwives and so no registration is made. It follows that the above figures are not complete.

Table II

ADMISSIONS AND DEATHS BY DISEASES

Disease	Bahr el Ghazal		Blue Nile		Darfur		Equatoria		Kassala		Khartoum		Kordofan		Northern		Upper Nile		Total		
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	
1. Cholera	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
2. Plague	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2
3. Small-Pox	—	—	243	59	15	1	—	—	45	18	13	1	37	11	10	—	—	—	363	90	3
4. Typhus	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4
5. Yellow Fever	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5
6. T.B. Pulmonary	227	22	856	37	92	13	309	22	449	37	1,014	38	395	32	264	9	258	15	3,864	225	6
7. T.B. Non-Pulmonary	58	2	255	16	51	4	41	6	208	10	189	9	139	3	105	1	89	1	1,135	52	7
8. Pneumonia	412	27	1,426	73	963	42	1,373	89	521	36	1,186	64	2,812	70	607	27	964	25	10,264	453	8
9. Influenza	29	—	19	—	194	2	1,053	21	110	—	184	2	333	7	172	—	—	—	2,094	32	9
10. Other Respiratory Diseases	285	8	1,249	30	418	5	590	8	3,512	19	502	10	17,334	53	1,345	11	1,754	11	26,989	155	10
11. Cerebro-spinal Meningitis	509	74	66	16	15	6	223	60	13	3	31	15	46	12	12	3	237	19	1,152	208	11
12. Chicken Pox	414	5	319	—	463	—	1,198	—	211	—	123	1	800	9	56	—	137	—	3,721	15	12
13. Diphtheria	2	—	127	18	18	2	4	—	197	4	183	14	97	—	49	14	4	—	681	52	13
14. Encephalitis Lethargica	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	1	—	14
15. Measles	51	4	75	2	146	—	1,044	9	128	—	57	2	224	5	34	—	155	—	1,914	22	15
16. Mumps	22	—	39	2	162	1	32	—	46	—	41	—	148	—	41	—	34	2	565	5	16
17. Poliomyelitis, acute	—	—	5	—	—	—	2	—	—	—	12	1	3	—	5	—	—	—	27	1	17
18. Rheumatism, acute	128	5	157	3	92	1	37	1	82	—	73	—	284	2	237	4	169	2	1,259	18	18
19. Whooping Cough	2	—	71	1	25	1	47	3	11	—	146	1	51	15	28	2	35	4	416	27	19
20. Dysentery	385	26	556	17	550	16	738	39	294	19	380	3	577	—	670	2	1,063	61	5,213	183	20
21. Enteric Fever	3	1	135	8	5	—	6	1	51	—	48	—	9	—	127	7	53	2	437	19	21
22. Gastro-enteritis of children	32	5	739	129	73	11	200	24	456	38	806	84	455	10	1,106	60	248	12	4,115	373	22
23. Undulant Fever	1	—	40	1	—	—	2	—	23	2	7	—	2	—	4	—	3	—	82	3	23
24. Filariasis	2	2	2	—	—	—	46	—	—	—	—	—	2	1	—	—	3	—	55	1	24
25. Leishmaniasis	—	—	3,422	99	6	—	159	25	569	57	65	12	47	2	3	1	1,316	69	5,587	265	25
26. Malaria	911	44	1,754	45	1,083	19	3,276	145	1,591	28	329	8	3,427	51	365	3	1,630	18	14,366	361	26
27. Blackwater Fever	1	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	2	—	27
28. Onchocerciasis	48	—	—	—	—	—	—	—	—	—	—	1	1	—	—	—	—	—	49	1	28
29. Phlebotomus Fever	—	—	—	—	—	—	—	—	6	—	—	—	—	—	—	—	—	—	6	—	29
30. Relapsing Fever	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	30
31. Trypanosomiasis	—	—	—	—	—	—	169	2	—	—	—	—	—	—	—	—	—	—	169	2	31
32. Ancylostomiasis	380	16	9	—	38	1	1,151	10	1	—	3	—	9	—	55	—	41	-	1,687	27	32
33. Dracontiasis	109	—	22	—	5	—	199	1	11	2	52	—	75	—	—	—	116	—	589	3	33
34. Schistasomiasis	14	—	355	14	35	1	423	13	44	—	179	2	126	—	101	—	31	—	1,308	30	34
35. Gonorrhoea	142	—	20	—	172	—	558	—	88	—	23	—	291	—	8	—	174	1	1,476	1	35
36. Soft Sore	1	—	10	—	21	—	5	—	5	—	6	—	46	—	—	—	8	—	102	—	36
37. Syphilis	217	—	55	3	1,081	3	882	2	67	—	29	—	623	9	90	1	699	1	3,743	19	37
38. Yaws	129	1	1	—	2	—	457	3	3	1	—	—	1	1	1	—	740	—	1,334	6	38
39. Anthrax	—	—	—	—	—	—	32	2	17	—	6	—	1	1	—	—	26	1	82	4	39
40. Hydrophobia, human	1	1	5	5	3	3	2	2	1	1	2	2	9	9	4	4	—	—	27	27	40
41. Leprosy	—	—	5	—	6	—	11	—	2	—	27	1	4	—	3	—	60	1	118	2	41
42. Madura Diseases	—	—	128	1	6	—	1	1	32	1	238	2	27	1	36	—	3	—	471	6	42
43. Tetanus	6	1	91	25	12	7	24	14	11	3	9	2	17	8	15	7	27	6	212	73	43
44. Heat Stroke Syndrome	—	—	—	—	—	—	—	—	17	1	—	—	—	—	4	—	—	—	21	1	44
45. Confinements	387	6	1,012	16	249	10	486	4	575	7	1,099	8	803	20	321	18	264	4	5,196	93	45
46. Gynaecological	142	—	1,466	17	427	5	111	2	1,040	2	1,492	8	1,109	6	697	8	107	—	6,591	48	46
47. Diseases of Pregnancy and Parturition	39	3	1,883	31	8	—	258	2	6	—	696	9	159	1	135	3	—	—	3,184	49	47
48. Puerperal Fever	2	—	136	3	8	1	—	—	18	—	39	4	91	6	22	3	—	—	316	17	48
49. Wounds and Injuries	1,795	35	4,640	85	2,812	71	4,628	61	6,960	29	3,223	30	4,646	73	2,215	30	2,995	21	33,914	435	49
50. Tropical Ulcer	739	6	19	—	168	4	959	2	24	—	24	18	498	—	5	—	761	4	3,197	34	50
51. Diabetes	9	—	112	5	19	—	1	—	61	2	364	14	52	4	204	2	—	—	822	27	51
52. Pellagra	—	—	—	—	—	—	1	1	—	—	—	—	2	1	—	—	12	—	15	2	52
53. Scurvy	1	—	18	2	—	—	1	—	8	—	6	—	42	—	5	—	4	—	85	2	53
54. Neoplasms, malignant	6	1	62	13	19	4	16	—	40	6	103	22	33	6	26	2	15	1	320	55	54
55. Neoplasms, non-malignant	10	—	50	3	82	—	38	1	73	3	180	3	82	—	27	—	11	—	553	10	55
56. Trachoma	2	—	3	—	17	—	39	—	—	—	971	—	34	—	54	—	65	—	1,185	—	56
57. All other eye diseases	128	—	415	1	232	1	762	—	502	1	329	—	759	—	559	3	599	—	4,285	6	57
58. Ear diseases	14	—	21	1	35	—	107	—	80	—	20	2	245	—	90	1	218	—	830	4	58
59. Skin diseases	90	—	222	3	76	—	417	2	88	1	167	2	511	15	276	2	212	—	2,059	25	59
60. Alimentary diseases	398	43	2,880	234	1,322	55	2,265	124	4,269	108	3,349	114	2,737	83	1,886	40	1,488	82	20,594	883	60
61. Circulatory diseases	57	8	989	103	258	18	37	3	603	40	1,090	135	520	102	702	38	281	26	4,537	473	61
62. Genito-Urinary diseases	57	2	724	39	359	11	54	1	452	7	475	23	524	36	661	14	256	4	3,562	137	62
63. Organic Nervous diseases	5	—	157	9	39	3	5	—	131	5	177	8	127	8	90	3	40	2	771	38	63
64. Functional Nervous diseases	17	2	44	3	21	—	20	—	—	—	6	—	29	1	38	1	—	—	175	7	64
65. Fever of uncertain origin	204	11	1,001	63	170	10	309	13	483	12	559	14	269	21	889	16	1,166	32	5,050	192	65
66. All other conditions	4,209	194	2,137	54	680	25	3,463	89	1,723	34	2,061	54	1,425	74	800	20	1,812	15	18,310	559	66
67. Poisoning	—	—	54	10	20	1	—	—	—	—	—	—	1	—	75	3	—	—	150	14	67
Total	12,832	553	30,301	1,299	12,773	358	28,272	808	25,958	537	22,394	743	43,150	769	15,334	363	20,383	442	211,397	5,872	
Missions	—	—	—	—	—	—	—	—	—	—	1,105	69	3,246	50	—	—	790	49	5,141	168	
Grand Total	12,832	553	30,301	1,299	12,773	358	28,272	808	25,958	537	23,499	812	46,396	819	15,334	363	21,173	491	216,538	6,040	

Table VIII

Species of Parasites in 8,344 Positive Slides

Province	*P. Falciparum*	*P. Vivax*	*P. Malaria*
Bahr El Ghazal	328	86	1
Blue Nile	939	63	—
Darfur	953	29	—
Equatoria	2,276	41	46
Kassala	926	135	—
Khartoum	242	19	—
Kordofan	1,480	79	1
Northern	202	16	—
Upper Nile	337	58	87
Total	7,683	526	135

(ii) **Blackwater Fever** : 2 cases were reported this year, one from Bahr El Ghazal and the other from Equatoria. Last year no case was recorded.

(iii) **Relapsing Fever** : No case was reported this year.

Table IX

Relapsing Fever, Cases and Deaths over 10 Years

Year	Cases	Deaths
1949	376	3
1950/51 (18 months)	36	2
1951/52	12	—
1952/53	97	14
1953/54	91	8
1954/55	3	1
1955/56	1	—
1956/57	4	—
1957/58	—	—
1958/59	—	—

Delousing with D.D.T. powder is in force for all immigrants from the west at frontier posts where the disease used to be imported in the past.

(iv) *Leishmaniasis* : Cases reported this year were 8,414 as compared with 3,939 cases last year.

In Blue Nile Province the disease was encountered in almost all parts of the Province including the Gezira Irrigated Area. 4,510 cases were reported from Blue Nile Province.

In Upper Nile the major epidemic of Kala-Azar which started in 1955/56 continued this year. 3,055 cases were reported there.

Special campaigns are still continuing. The help of the United States Naval Medical Research Unit No. 3 (Namru-3) was invited. It is hoped that the establishment of laboratories and field research by this Unit may help to bridge the gaps in the epidemiology of the disease and make the eradication of the disease possible in the future.

Table X

Leishmaniasis Recorded Incidence in 10 Years

Year	No. of Cases
1949	523
1950/51 (18 months)	638
1951/52	1,063
1952/53	613
1953/54	895
1954/55	1,106
1955/56	1,889
1956/57	7,463
1957/58	3,939
1958/59	8,414

Table XI

Leishmaniases 1958/59 : *Distribution by Provinces*

Province	Cases	Deaths
Bahr El Ghazal	—	—
Blue Nile	4,510	99
Darfur	6	—
Equatoria	159	25
Kassala	569	57
Khartoum	65	12
Kordofan	47	2
Northern	3	1
Upper Nile	3,055	69
Total	8,414	265

(v) *Trypanosomiasis* : New cases detected were 169 with two deaths. In 1957/58 there were 159.

Regular Sleeping Sickness Inspections of the population were carried out during the year in Yei, Yambio and Tembura District of Equatoria Province. The use of Lomidine by injections as prophylactic measures against Tripanosomiasis was continued and 61,615 persons were injected.

Table XII shows the distribution of cases for 10 years.

TABLE XII

Trypanosomiases : Distribution of Cases in Equatoria in 10 Years

Years	Yubu	Yambio	Yei	Kajo-Kaji	Meridi	Imported	Other Localities
1949 ...	5	12	17	—	—	—	—
1950/51	15	33	12	—	—	—	—
1951/52	—	93	3	—	2	26	—
1952/53	—	53	18	—	—	2	—
1953/54	12	148	44	—	—	—	—
1954/55	—	467	92	—	1	1	—
1955/56	2	210	98	—	—	—	—
1956/57	18	871	74	2	4	—	—
1957/58	34	37	88	—	—	—	—
1958/59	8	37	118	—	4	—	2

(vi) *Filariasis* : 1,125 cases were microscopically diagnosed during the year.

1,118 cases of this total came from Equatoria, Bahr El Ghazal and Upper Nile of the Southern Sudan.

2. EPIDEMIC AND ENDEMIC DISEASES

(i) *Anthrax.* 132 cases with 4 deaths were reported.

(ii) *Cerebrospinal Meningitis.* 1,179 cases with 208 deaths were reported this year.

TABLE XIII

Cerebrospinal Meningitis : Recorded Incidence and Fatality 1958/59

Province	Cases	Deaths	Fatality Rate
Blue Nile	90	16	17.8
Darfur	16	6	37.5
Kassala	13	3	23.1
Khartoum	32	15	46.9
Kordofan	46	12	26.1
Northern	13	3	23.1
TOTAL NORTHERN PROVINCES	210	55	26.2
Bahr El Ghazal	509	74	14.5
Equatoria	223	60	26.9
Upper Nile	237	19	8.0
TOTAL SOUTHERN PROVINCES	969	153	15.9
OVERALL TOTAL	1,179	208	17.6

Table XIV

Cerebrospinal Meningitis : Recorded Incidence and Fatality over 10 Years

Year	Recorded Cases	Recorded Deaths	Fatality Rate
1949	353	102	28.9
1950/51 (18 months)	57,575	7,710	13.4
1951/52	14,527	2,031	14.0
1952/53	2,938	644	21.9
1953/54	8,942	827	9.2
1954/55	3,470	492	14.2
1955/56	9,028	828	9.2
1956/57	5,888	578	9.9
1957/58	2,008	178	8.8
1958/59	1,179	208	17.6

Table XV

(iii) *Diphtheria : Recorded Incidence and Fatality During the Year*

Province	Recorded Cases	Recorded Deaths	Fatality Rate
Bahr El Ghazal	2	—	—
Blue Nile	137	18	13.1
Darfur	19	2	10.5
Equatoria	4	—	—
Kassala	220	4	1.8
Khartoum	324	14	4.3
Kordofan	97	—	—
Northern	52	14	26.9
Upper Nile	4	—	—
Total	859	52	6.1

Table XVI

Diphtheria : Recorded Incidence and Deaths in 10 Years

Year	Cases	Deaths
1949	264	36
1950/51 (18 months)	573	77
1951/52	280	39
1952/53	717	37
1953/54	335	27
1954/55	369	61
1955/56	356	38
1956/57	1,497	52
1957/58	506	38
1958/59	859	52

(iv) *Dysentery.* 5,213 cases were treated in hospitals and 166,118 as out-patient cases.

(v) *Enteric Fever.* 687 cases with 19 deaths were reported during the year.

Table XVII

Enteric Fever : Distribution 1958/59

Province	Cases	Deaths
Bahr El Ghazal	3	1
Blue Nile	139	8
Darfur	5	—
Equatoria	6	1
Kassala	52	—
Khartoum	293	—
Kordofan	9	—
Northern	127	7
Upper Nile	53	2
Total	687	19

Table XVIII

Enteric Fever : Incidence over 10 Years

Year	Record Cases
1949	311
1950/51 (18 months)	560
1951/52	578
1952/53	598
1953/54	560
1954/55	548
1955/56	449
1956/57	410
1957/58	361
1958/59	687

(vi) *Gastro-Enteritis of Children.* Records of hospitals and dispensaries registered 130,398 cases of which 4,113 required hospitalization, with 373 deaths; fatality rate of 9.1 per cent.

(vii) *Leprosy.* The total number of inmates in the country was 3,135.

During the year 1,467 cases were diagnosed, of which 877 came from Equatoria Province endemic zone.

(viii) *Poliomyelitis.* 92 cases were recorded this year. 27 received hospital treatment with one death.

(ix) *Rabies.* 31 human cases were recorded during the year.

(x) *Small Pox.* The total number of cases reported was 380 with 90 deaths in the whole country.

Distribution of Small Pox cases by Provinces is as follows :—

Province	Cases
Blue Nile	260
Darfur	15
Kassala	45
Khartoum	13
Kordofan	37
Northern	10
TOTAL	380

Incidence of Small Pox and Vaccinations performed in the Last Ten Years

YEAR	Cases	Vaccinations Performed
1949	246	524,693
1950/51 (18 months)	110	136,728
1951/52	346	593,372
1952/53	3,670	1,008,581
1953/54	3,030	1,500,000
1954/55	4,200	1,203,673
1955/56	1,427	1,748,190
1956/57	25	648,501
1957/58	295	2,678,223
1958/59	380	2,440,084

The number of Small Pox vaccinations done during the year was as follows :—

Bahr El Ghazal	1,108
Blue Nile	893,767
Darfur	162,377
Equatoria	17,578
Kassala	383,087
Khartoum	446,060
Kordofan	368,532
Northern	124,143
Upper Nile	43,432
TOTAL ..	2,440,084

(xi) *Influenza.* 70,937 cases were reported during the year with 32 deaths as compared with 389,346 cases and 70 deaths last year.

(xii) *Tuberculosis.* During the year 1958/59 the Mass B.C.G. Vaccination Campaigns continued to be waged in Equatoria Province. By March, 1959 all the Western Districts were covered and the Campaign was shifted to Eastern parts of the Province which were much more difficult on account of the remoteness of their tribes especially those of Kapoeta District but nevertheless the Campaign achieved a notable success and apart from offering vaccination which is the main objective, it was an effective tool of general health education amongst the public.

Figures for the Year

District	No. Tested	No. Positives	No. Vaccinated	No. Negative not Vaccinated
Juba	57,641	15,060	23,539	796
Yei	50,089	12,720	20,373	340
Maridi	36,425	12,665	13,310	377
Yambio	41,448	14,722	12,240	258
Torit	53,891	13,536	21,803	456
Kapoeta	29,603	4,457	14,149	405
Total	269,097	73,160	105,414	2,632

Table XIX

Tuberculosis. Admissions to hospitals in 10 years

Year	Pulmonary	Non-Pulmonary	Total
1949	1,176	650	1,826
1950/51 (18 months)	1,611	883	2,494
1951/52	1,325	747	2,072
1952/53	1,679	671	2,350
1953/54	2,075	798	2,873
1954/55	2,868	915	3,783
1955/56	2,697	823	3,520
1956/57	3,175	1,005	4,180
1957/58	3,749	1,061	4,810
1958/59	3,864	1,135	4,999

Table XX

Tuberculosis Hospital Admissions by Provinces

Province	Pulmonary	Non-Pulmonary	Total
Bahr El Ghazal	227	58	285
Blue Nile	856	255	1,111
Darfur	92	51	143
Equatoria	309	41	350
Kassala	449	208	657
Khartoum	1,014	189	1,203
Kordofan	395	139	534
Northern	264	105	369
Upper Nile	258	89	347
Total	3,864	1,135	4,999

TABLE XXI

Tuberculosis : 1958/59 *Distribution of all Cases Diagnosed*

PROVINCE	Pulmonary	Non-Pulmonary	TOTAL
Bahr El Ghazal	418	85	503
Blue Nile	1,163	758	1,921
Darfur	167	144	311
Equatoria	333	53	386
Kassala	812	645	1,457
Khartoum	2,290	397	2,687
Kordofan	486	326	812
Northern	519	278	797
Upper Nile	691	913	1,604
TOTAL	6,879	3,599	10,478

3. HELMENTHIC DISEASES

(i) *Ankylostomiasis.* 10,050 cases were recorded, of these 9,401 cases were reported from two Southern Provinces *i.e.* Bahr El Ghazal and Equatoria.

(ii) *Dracontiasis.* 4,492 cases were treated during the year.

(iii) *Bilharzia.* The snail control in the Gezira Scheme continued on the same lines followed before *i.e.* Mechanical trapping, chemical traps and regular inspections of canals for search of snails. At the same time curative teams are dealing with discovered cases. 5,600 Bilharzia Snails Vectors were detected and destroyed as compared with 3,464 the year before. No explanation was given for the big catch but it is believed that it is due to more supervision being exercised on the labourers.

BILHARZIA IN GEZIRA IRRIGATED AREA

	HAEMATOBIUM						MANSONI					
	CHILDREN			ADULTS			CHILDREN			ADULTS		
YEAR	No.	Inf.	%	No.	Inf.	%	No.	Inf.	%	No.	Inf.	%
1955/56	15,153	665	4.4	28,697	8,199	2.8	15,153	1,255	8.3	28,697	1,942	6.7
1956/57	45,662	1,188	2.5	61,762	1,136	1.8	45,662	1,620	3.5	61,762	2,907	4.7
1957/58	36,133	1,057	2.9	56,961	961	1.5	36,133	1,859	5.1	56,961	3,873	6.8
1958/59	40,260	912	2.25	48,245	823	1.7	40,260	1,807	4.4	48,245	2,500	5.2

Distribution of Bilharzia cases recorded in the whole country was as follows:-

Province	Cases	Deaths
Bahr El Ghazal	423	—
Blue Nile	12,524	14
Darfur	3,545	1
Equatoria	4,619	13
Kassala	271	—
Khartoum	4,328	2
Kordofan	13,592	—
Northern	5,729	—
Upper Nile	63	—
Total	45,094	30

Incidence for the last 10 years is as follows :—

Year	Cases
1949	20,637
1950/51 (18 months)	58,809
1951/52	29,987
1952/53	29,286
1953/54	30,725
1954/55	37,570
1955/56	31,741
1956/57	43,863
1957/58	41,645
1958/59	45,094

(e) SANITARY CIRCUMSTANCES

Water Supplies : Gradual progress is being maintained to establish piped water supply in big towns. In Rural Areas protected haffirs (Artificial pools), deep wells and dams are being established to help cultivators and herdsmen.

Refuse Disposal : This is being carried out on orthodox methods of daily collection, burning and dumping mainly in towns.

Sewage Disposal : The Khartoum Town sewage is partly working and the old buckets are disappearing gradually. In other towns the same bucket system functions.

Aqua privy is gaining more popularity and most of the new houses are introducing it. In low income groups areas, local councils are aiding this system and refunding the assistance in small instalments.

Housing and Town Planning : This is being supervised by Boards at District, Province and Central levels. All plans and housing in towns should be approved by these boards.

In villages and rural areas local Councils are making efforts to improve the planning gradually.

CHAPTER IV

SOCIAL HYGIENE

Midwifery : The following table shows the midwifery training schools, date of foundation of each school, total number of midwives trained and number under training in 1958/59.

Table XXII

School	Date of Opening	Total Midwives Trained since Opening	No. of Midwives under Training 1958/59
Omdurman	1920	884	28
El Obeid	1948	80	12
Juba	1950	28	8
Malakal	1952	29	8
Medani	1953	67	12
Atbara	1955	37	11
Kassala	1957	4	4
El Fasher	1958	—	4
Total		1,129	87

Table XXIII

Distribution of Licensed Midwives in the Sudan

Province	District Midwives	Certificated Nurse Midwives	Un-certificated Nurse Midwives	Health Visitors	Total
Bahr El Ghazal ...	6	—	2	—	8
Blue Nile	167	11	10	7	195
Darfur	34	2	1	2	39
Equatoria	1	1	23	—	25
Kassala S.A.	17	4	—	1	22
Kassala N.A. ...	16	2	1	2	21
Khartoum	130	34	—	9	173
Kordofan	106	5	3	2	116
Northern	147	8	4	2	161
Upper Nile	27	1	1	1	30
	651	68	45	26	799

New Midwifery Certificates Issued During the Year

Province	Certificated Nurse	Village Midwives	Total
Blue Nile	1	12	13
Equatoria	6	—	6
Kassala	—	4	4
Khartoum	20	12	32
Kordofan	3	12	15
Northern	—	13	13
Upper Nile	—	8	8
Total	30	61	91

Refresher courses were given to midwives of the following Provinces :—

Province	No of Midwives
Khartoum	4
Northern	4
Kordofan	3
Equatoria	1
Total	12

Cases attended to by student midwives were as follows :—

School	Normal Delivery	Still Births and Abortions	Transferred to Hospital	By Doctors	Total
Omdurman	1,137	63	620	53	1,873
El Obeid	112	31	—	25	168
Medani	316	—	—	20	336
Kassala	117	1	—	10	128
Juba	101	—	409	20	530
Atbara	320	4	—	25	349
Total	2,103	99	1,029	153	3,384

Maternal and Child Health : Improvement and expansion in this important service continued. 2 Health Centres were opened during the year and training of staff maintained.

Unicef : is assisting in this service by provision of necessary equipment and books for training and supply of milk and vitamins for use in the Centres. 34 centres were assisted in this manner, during the year.

List below shows localities where Health Centres were operating :—

HEALTH CENTRES

Khartoum	6
Omdurman	5
Khartoum North	4
Dueim	1
Kosti	1
Singa	1
Hassaheissa	1
Medani	2
Hosh	1
El Fasher	1
Geneina	1
Juba	1
Kassala	1
Port Sudan	4
El Obeid	1
Atbara	1
Malakal	1
Nahud	1
Shendi	1
Ed Damer	1
	36

Ante Natal Clinics were operating in the following places where no health centres were established :—

Wau
Kwojok (Mission)
Sennar
Rosseires
Bakht Er Ruda
Nyala
Lui
Mundri (Mission)
Amadi
Torit
Khatmia
Gharb El Gash
Swagi
Gedaref
Deim El Arab
Tuti Island
Tendelti
Um Ruaba
Kadugli
Talodi
Abu Zabad
Moglad
Abri (Mission)
Heiban (Mission)
Dakhla
Berber
Police Camp (Medani)
Merowe
Wadi Halfa
Debeira
Hillat Gallaba
Fangak
Tonga

Activities of Health Centres and Ante-Natal Clinics throughout the Sudan for the Year 1958/59.

Province	No. of Clinics	Attendances at Ante-Natal Clinics	No. of Home Visits	No. of Health Centres	Attendances at Child Health Centres	No. of Deliveries by Trained Midwives
Bahr El Ghazal ...	1	3,017	—	—	—	324
Blue Nile	10	21,295	2,618	7	19,829	906
Darfur	2	7,312	1,319	2	9,338	592
Equatoria	5	4,153	—	1	2,170	510
Port Sudan	6	10,435	500	4	5,960	960
Kassala	6	8,806	416	1	6,547	854
Khartoum	16	61,874	5,110	15	66,508	14,829
Kordofan	11	12,538	168	2	3,124	1,595
Northern	11	4,781	1,016	3	8,279	320
Upper Nile	1	3,663	874	1	3,501	—
Total ...	69	137,874	12,021	36	125,256	20,890

MEDICAL EXAMINATION OF SCHOOL CHILDREN

School Medical Service: The number of pupils medically examined was:—

Bahr El Ghazal	1,902
Blue Nile	32,114
Darfur	9,431
Equatoria	5,417
Kassala	14,069
Port Sudan	5,241
Khartoum	16,024
Kordofan	10,132
Northern	40,681
Upper Nile	2,560
Total	137,572

Results of Examinations of School Children for Different Diseases

Province	No. Examined	Trachoma	Bilharzia	Enlarged Spleen	Pulm. T.B.	Ankylostoma	Dental Caries	All Other Diseases
Bahr El Ghazal	1,902	18	69	233	2	108	—	—
Blue Nile ...	27,044	2,440	746	516	—	1	—	117
G.I. Area ...	5,070	3,049	1,279	742	—	—	—	—
Darfur	9,431	1,035	596	915	—	19	8	721
Equatoria ...	5,417	65	301	437	—	550	—	51
Kassala ...	14,069	1,143	28	475	—	—	—	—
Port Sudan ...	5,241	480	16	5	—	—	—	—
Khartoum ...	16,024	745	3	18	—	—	1,193	1,996
Kordofan ...	10,132	662	2,369	1,945	6	—	—	96
Northern ...	40,681	13,140	2,203	522	1	—	5,020	—
Upper Nile ...	2,560	270	12	72	—	8	—	—
Total ...	137,571	23,047	7,622	5,880	9	686	6,221	2,981
Percentage ...		16.8	5.5	4.3	—	.5	4.5	2.2

Mental Health

The total number of cases seen during the year by the Psychiatrist at the Clinic for Nervous Disorders amounted to 16,614 of which 2,154 were new cases and the balance of 14,460 represented the return attendences.

The number of inmates in confinement at Kober Institute is 114 (104 males and 10 females).

The Mental Diseases Board saw 29 cases classified as follows :—

16 cases fit for temporary service or referred for treatment and to reappear before the board at certain dates.

6 cases unfit for Government service.

1 case unfit to manage his own affairs.

6 cases fit for Government service.

Health Education

The weekly radio talks, and exhibition of posters during tribal gatherings and Agricultural shows and press articles remained to be the media for Health Education.

The budding audo visual aid unit in Khartoum continued its activities and attempts at producing local films on health problems were made.

Health Week for Cleaniness

This practical way of teaching Health Education was initiated in Khartoum Town by the local health authorities. All categories of people ; official and non-official, men, women and children took part in cleaning streets and houses on the appointed day and it was a great success. It is gratifying to state that this was copied by other towns in the country and it no doubt left a good impression in the minds of the people on the importance of house cleanliness.

CHAPTER V

PORT HEALTH QUARANTINE

No seaport or airport was declared infected during the year.

Disinfection of aircraft and quarantine control of air travellers was undertaken at Wadi Halfa, Port Sudan, Khartoum, Juba, Malakal, Geneina, El Fasher, El Obeid.

The Aedic Index was calculated on an inspection of all habitations within the area concerned. The following table shows the aedic index throughout the year at certain airports on international routes :—

TABLE XXIV

Aedes Aegypti Index 1958/59

MONTH	Fasher	Juba	Kassala	Port Sudan	Khar-toum	El Obeid	Wadi Halfa	Malakal
July	0	0	0	0	0	0.01	0	0.2
August ...	0	0	0	0	0	0.5	0	1.2
September ...	0	0	0	0	0	0	0	0.4
October ...	0	0	0	0	0	0	0	0.2
November ...	0	0	0	0	0	0	0	0
December ...	0	0	0	0	0	0	0	0
January ...	0	0	0	0	0	0	0	0
February ...	0	0	0	0	0	0	0	0
March	0	0	0	0	0	0	0	0
April	0	0	0	0	0	0	0	0
May	0	0.1	0	0	0	0	0	0
June	0	0.06	0	0	0	0	0	0

Port Sudan Quarantine :—

1,254 ships entered Port Sudan Harbour, 363 Sambuks entered Flamingo Bay and Radio Pratique was granted to 477 ships.

Suakin Quarantine :—

The number of pilgrims who left Suakin for Jeddah in 10 years was as follows :—

YEAR	No. of Pilgrims
1949/50	5,091
1950/51	4,666
1951/52	6,491
1952/53	13,051
1953/54	13,950
1954/55	13,921
1955/56	11,427
1956/57	23,811
1957/58	29,618
1958/59	17,356

The total pilgrims who left by air from Port Sudan during the season were 3,167.

All outgoing pilgrims were immunised against Cholera. Small Pox, Yellow Fever and Typhoid.

It was a hard pilgrimage this year for the Sudanese; the majority of the returning pilgrims suffered or were suffering from some form of coryza or bronchitis aggravated by heat exhaustion.

Wadi Halfa Quarantine:

Examination of labourers coming from Egypt was carried out as usual. 263 river vessels were inspected during the year. 2,453 vaccinations against Small Pox were done in this quarantine.

Geneina Quarantine:

48,142 persons passed through this quarantine. 25,789 vaccinations against Small Pox were done.

Medical Mission to the Hedjaz:

The Mission consisted of two doctors and 18 other staff. Treatment centres were established at Jeddah, Mecca, Muna and Medina. Medical care was afforded to many nationalities, including pilgrims and local population.

CHAPTER VI

EXISTING HOSPITALS, DISPENSARIES AND DRESSING STATIONS AND BEDS AVAILABLE

TABLE XXV

PROVINCE	Hospitals (53)	Beds in Hospitals				Dispensaries	Beds in Dispensaries	Total Beds	Dressing Stations	Population	Beds per 1,000 Population
		General	T.B.	Children	Maternity						
Bahr El Ghazal	Wau ...	191	40	8	9						
	Rumbeik ...	119	—	—	—						
	Aweil ...	40	—	—	—	14	198	645	43	1,150,000	0.56
	Raga ...	40	—	—	—						
		390	40	8	9						
Blue Nile ...	Medani ...	328	120	45	8						
	Sennar ...	156	—	8	—						
	Singa ...	150	—	—	—						
	Roseires ...	102	—	—	—	59	47	1,600	85	2,290,000	0.70
	Kurmuk ...	50	—	—	—						
	Rufaa ...	100	—	—	—						
	Dueim ...	98	—	—	16						
	Kosti ...	136	—	—	16						
	Abu Usher	164	40	10	6						
		1,284	160	63	46						
Darfur	El Fasher ...	176	5	15	6						
	Geneina ...	96	—	4	—						
	Nyala ...	88	—	4	8	44	402	879	40	1,458,000	0.60
	Zalingei ...	75	—	—	—						
		435	5	23	14						

Province	Hospitals (53)	Beds in Hospitals				Dispensaries	Beds in Dispensaries	Total Beds	Dressing Stations	Population	Beds per 1,000 Population
		General	T.B.	Children	Maternity						
Equatoria ...	Juba ...	250	64	45	14						
	Lui	45	8	3	4						
	Maridi ...	110	5	4	5						
	Li Rangu ...	118	12	2	5	70	477	1,591	64	991,000	1.60
	Source Yub	100	19	—	2						
	Yei	65	14	—	4						
	Torit ...	123	10	—	1						
	Kapoeta ...	82	—	—	—						
		893	132	54	35						
Kassala ...	Kassala ...	256	40	20	16						
	Gedaref ...	179	20	12	3						
	Aroma ...	100	—	6	—	48	176	1,204	53	1,025,000	1.25
	Port Sudan...	209	68	23	14						
	Tokar ...	62	—	—	—						
		806	128	61	33						
Khartoum ...	Khartoum ...	528	13	119	56						
	Omdurman...	229	—	56	—						
	Khartoum N.	96	—	14	—						
	River Hosp.	—	110	—	—	32	45	1,557	19	558,000	2.80
	Eye Hospital	103	—	15	—						
	Abu Deleig...	40	—	—	—						
	Abu Anga ...	—	93	—	—						
	Maternity Hosp. Omd.	—	—	—	40						
		996	216	204	96						

Province	Hospitals (53)	Beds in Hospitals				Dispensaries	Beds in Dispensaries	Total Beds	Dressing Stations	Population	Beds per 1,000 Population
		General	T.B.	Children	Maternity						
Kordofan ...	El Obeid ...	245	48	22	45						
	Kadugli ...	117	8	—	3						
	Abu Gebeiha	80	—	12	8						
	Dilling ...	78	—	—	8	58	616	1,516	56	1,959,000	0.77
	Talodi ...	60	—	—	—						
	Nahud ...	109	—	9	2						
	Rig El Fula	38	—	—	8						
		727	56	43	74						
Northern ...	Atbara ...	210	36	16	19						
	Halfa ...	120	46	22	14						
	Dongola ...	65	12	1	8	74	106	930	92	968,000	0.96
	Merowe ...	59	7	8	9						
	Berber ...	81	—	10	9						
	Shendi ...	60	—	8	4						
		595	101	65	63						
Upper Nile ...	Malakal ...	231	28	36	18	36	297	708	21	991,000	0.71
	Bor ...	93	—	—	5						
		324	28	36	23						
Grand Total		6,458	866	557	385	435	2,364	10,630	473	11,390,000	0.93

The Ratio for Hospital Beds only is 0.73 per 1,000 population.

CHAPTER VII

MEDICAL MISSIONS

The following table shows the work carried out by the Medical Missions.

Medical Mission	In-patient	Out-patient Attendances	Operations	No. of Beds
Church Missionary Society				
Omdurman (Khartoum Province) ...	1,105	64,302	196	70
Katcha (Kordofan Province)	838	43,592	—	20
American Mission				
Nasir (Upper Nile)	268	66,136	586	—
Akobo (Upper Nile)	112	10,297	2	—
Ler (Upper Nile)	169	13,324	315	—
Doleib Hill (Upper Nile)	—	27,137	—	—
Pibor (Upper Nile)	—	14,401	70	—
Sudan Interior Mission				
Doro (Upper Nile)	241	24,687	—	—
Banjang (Upper Nile)	—	5,868	—	—
Abaiyat (Upper Nile)	—	10,450	—	—
Sudan United Mission				
Taybania (Kordofan Province) ...	185	18,362	—	—
Abri (Kordofan Province)	440	25,094	—	20
Kawda (Kordofan Province)	214	25,287	—	18
Heiban (Kordofan Province)	598	24,360	—	16
Nyokama (Kordofan Province) ...	631	12,271	—	—
Salara (Kordofan Province)	100	6,070	—	20
Total	4,901	391,638	1,169	164

MEDICAL TRAINING

School of Hygiene :

During the year 25 students were under training. Of the 10 students who sat for the Royal Society of Health Examination in March, 1959, seven passed the examination. The other three have been referred for a period of 3 months.

Medical Assistants Training School :

39 students were under training during the year ; 36 have passed and were qualified in March, 1959.

Nurses Training School :

418 nurses sat for the final Nursing Examination. Successful candidates were 326.

Laboratory Technicians and Assistants :

7 Laboratory Technicians and 12 Laboratory Assistants were under training

Radiographers :

10 Students were under training.

Dispensers :

5 Students were under training

CHAPTER VIII

Laboratories Services

(a) STACK MEDICAL RESEARCH LABORATORIES

By

Dr. M. A. Haseeb

This report covers the period from July 1st. 1958 to June 30th. 1959. During this period *ad hoc* research was carried out on Kala-Azar, poliomyelitis, small pox vaccine, Staphylococci, blood and neoplasms. Summaries of these and other research activities will be found under the appropriate headings.

As in previous years a great part of the time of the staff was devoted to the teaching of laboratory technician trainees recruited from the secondary schools.

Among visitors to the Laboratories were Dr. Sidgi and Mr. Ladderman from the Regional Office of the World Health Organization of the Mediterranean region, Alexandria. The use of dry small-pox vaccine was discussed with them and they helped in installing an Edwards dry freeze centrifugal apparatus.

The visit of Professor Spooner last year was fruitful in giving the Stack Laboratories recognition as an approved Laboratory for teaching technicians. The three years spent by technician trainees are now accepted by the Institute for Medical Laboratory Technology, London, as part of the time required for the Intermediate Examination.

The writer spent two months in Cairo to study paper electrophoresis and make himself acquainted with the research and laboratory centres in Cairo. The writer spent one month in the Pasteur Institute of Southern India, Coonoor, attending a Course on "Laboratory Methods in the Diagnosis of Viral and Rickettsial Diseases."

EDUCATION AND ROUTINE ACTIVITIES

Twelve laboratory assistants were given refresher courses of two to three months duration on advanced laboratory techniques including the kahn test. It was also possible to train laboratory assistants for the Church Missionary Society, Omdurman, the American Interior Mission and the Sudan Medical Corps.

Twelve laboratory assistants were trained and employed to fill vacancies in the newly-built hospitals or to augment the staff in big hospitals.

Six laboratory assistants were devoted to Kala-Azar work in the Fung and Malakal areas for several months during this year.

Female students from the Nursing College, Khartoum were given practical classes in bacteriology, parasitology, haematology and other laboratory tests.

As usual the teaching of theoretical and practical bacteriology and parasitology to the Medical students of the Faculty of Medicine, University of Khartoum and also the teaching of forensic medicine to the same students and the students of the Police College, Khartoum, have made heavy demands on the time of the laboratory staff.

TECHNICIANS CLASS

Of the seven technician trainees three completed their training and passed the final examination successfully. The other four continued to receive training throughout the year.

The laboratory technician who is now working in the Sectorial Bacteriological Laboratories, Mearnskirk Hospital, Newton, has sat for the Associate Examination of the Institute of Medical Laboratory Technology. The result of the examination is not yet to hand.

The two laboratory technicians studying in the American University of Beirut are continuing their studies.

During this year the teaching of technicians in these Laboratories received recognition by the Institute of Medical Laboratory Technology, London, and the period of three years is now accepted as time qualifying for sitting the Intermediate examination of that Institute.

ROUTINE WORK

A summary of the work and researches carried out during the period under review is appended to the report. The total number of examinations was 37,324 as compared with 34,981 in the previous year and 42,436 in 1956/57.

As in previous years histological work of rather highly specialised type continued to increase; demands for examinations of testicular and endometrial biopsies are still increasing. Demands for testing organisms for sensitivity for antibiotics continued to increase. As in the previous years it is noted that Staphylococci became more and more resistant to penicillin.

Forensic medicine: medico-legal work requested by the police has multiplied several times. The demands cover requests to identify and group blood stains and seminal stains, plant and food poisons and opium and other herbs used locally by the peoples of the Sudan. The establishment of a separate laboratory for medico-legal work became most essential, as such work requires time and devotion.

The issue of lymph vaccine was 2,875,000 doses this year compared with 2,500,000 doses last year. Dry lymph vaccine has been produced on a small experimental scale. Use was made of the newly acquired Edward's centrifugal freeze-dry apparatus. The details of the experiment will be recorded under the appropriate heading.

The demand of anti-rabic vaccine has also increased from 526,500 doses last year to 635,000 doses this year.

POST MORTEM EXAMINATION

35 post-mortem examinations were performed in Khartoum Civil Hospital Mortuary in the year under review of which 26 are medico-legal.

PATHOLOGICAL SPECIMENS

The total was 1,030 excluding brains for rabies, the total of the previous year was 927.

NEOPLASMS

153 Neoplasms were received of which the following table is a summary;

Table

	Carcinoma		Sarcoma		Melanoma		Total Malign-ant	Benign	Total Benign
	Pr.	Sec.	Pr.	Sec.	Pr.	Sec.			
Genito-urinary System							63		60
External Genitals ...	4	2					6	2	
Uterus and Cervix	19						19	24	
Ovary	5	1	1				7	9	
Testicle	1						1		
Prostate	6						6	7	
Bladder	4		1				5	2	
Kidney	2						2		
Breast	16		1				17	16	
Gastro-intestinal tract							8		19
Lip and Mouth ...	1						1	6	
Tongue	2						2		
Stomach	1						1		
Small intestine ...	1						1		
Large intestine ...									
Liver		2					2		
Rectum and Anus		1					1	13	
Glands & Endocrines							37		1
Thyroid Gland ...	6						6	1	
Salivary Glands ...	3	1					4		
Lymphatic Glands		9	14	3		1	27		
Head and Neck ...							9		20
Eye and Orbit ...	2	1	3				6	7	
Face	2						2	10	
Scalp	1						1	3	
Neck structures ...									
Musculo-Skeletal ...							5		15
Arm and Hand ...								4	
Trunk			1				1	3	
Buttock			1				1	2	
Thigh								1	
Leg		1	1		1		3	4	
Foot								1	
Skin and Appendages							7		19
Face and Neck ...	5						5	4	
Arm and Hand ...									
Trunk								1	
Lower limbs ...	2						2	3	
Peripheral Neural Lesion								11	
Unclassified	16	2	2		2	2	24	16	16
Total							153		150

PATHOLOGICAL SPECIMENS

Dr. Mirghani Yousif Ali the Pathologist reports as follows : During this period there was marked increase of Gynaecological specimens from the various Gynaecological Units. It is noted that the uterine, cervical and breast tumours formed the majority of neoplasms in the records. A new punch card system is now being established to facilitate record keeping of neoplasms and classified disease entities together with their place of origin.

Neoplasms: 153 malignant neoplasms were reported as shown in the table above. A list of the benign tumours also appear in the various regional classification in that table.

MALIGNANT EPITHELIAL TUMOURS

An important article on this subject was published by Mr. B. Brendan Hickey, Consultant Surgeon, Glantawe Hospital, England. The subject of the article was a Hunterian lecture delivered at the Royal College of Surgeons of England (Annals of the Royal College of Surgeon of England, 1959, Vol. 24, page 303).

The materials presented consist of specimens of tumours, which have been received in the Stack Medical Research Laboratories for the period of eighteen years from 1935 to 1954 and comprise 1,337 specimens all of which have been examined histologically.

The number of growths according to site and numbers are as below in order :

Skin	Comprising :	Epitheliomata	284	
		Malignant Melanomata ..	108	
		Roden Ulcer	45	437
Breast				306
Uterus				91
Rectum and Anus	Comprising :	Adenocarcinomata of Rectum ..	44	
		Squamous Carcinoma Anal Canal ..	22	
		Melanoma of Anal Canal	1	67
Salivary Glands	Comprising	"Mixed"	47	
		Carcinoma	9	56
Bladder				54
Mouth, including lips				51
Abdominal				45
Vagina				38
Liver				38
Penis				26
Ovary				23
Thyroid				19
Prostate				18
Jaw (adamantinomata)				17
Testis				16
Tongue				7
Intestine (Colon)				7

Kidney	6
Vulva	5
Stomach	5
Spinal Cord (Glioblastoma Multiforme)	1
Oesophagus	1
TOTAL ..	1,337

It will be seen that the commonest site for malignant growths is the skin, followed closely by the breast which produces the most frequent single growth, with the female genital tract third. This corresponds generally with the findings of other investigators in Africa, Elms and Baldwin (1947) in Nigerians, and Vint (1935) in natives of Kenya, who all find skin cancers ranking high with breast and female genitalia approaching. In the adjacent country, Uganda, Davies (1948) is of the opinion that while skin cancer is not so frequently seen in post-mortem material, it is actually the commonest malignant tumour among central Africans.

Professor Hickey summed up as follows :—

(1) One thousand, three hundred and thirty-seven specimens of malignant epithelial growths received in the Stack Laboratories, Khartoum from 1935 to 1954 have been classified.

(2) The site incidence of malignant epithelial tumours among the natives of the Sudan is found to vary materially in some respects from the European and from the African living in the United States of America. The greatest difference is in the relatively large numbers of cutaneous cancers seen among the native Sudanese. It is suggested that local environmental and not genetic causes account for this.

(3) The breast and female genital tract are frequent sites for carcinoma in the Sudanese women ; it is probable they are as liable to contract this condition as their European counterpart.

(4) Carcinoma of the stomach and colon are infrequent. It is probable that rarity of gastric ulceration is related to the infrequency of gastric carcinoma. It is possible that the relative rarity of colonic carcinoma could be a racial trait. Malignant epithelial growths of most other organs are encountered among the Sudanese, but carcinoma of the lung is among the rarest.

RABIES

333 brains were received of which 39 were decomposed and useless for examination ; of the remaining 60 were positive for Negri bodies. This contrasts with 80 positive out of 340 received last year. Three cases of human rabies were reported, two from Kassala Province and one from Khartoum Province. In all three cases the animal incriminated was a stray dog. The bites were severe and on the face. The incubation period was less than 21 days. The vaccine failed to protect. It is, therefore, felt that combined treatment with rabic immune serum and vaccine should be resorted to in severe bites.

The species and distribution of positives and negatives in the past year series is shown in the following table :

RABIES EXAMINATIONS

Name	Positive	Negative	Decomposed	Total
Dog	38	163	31	232
Monkey	—	9	2	11
Bovine	—	1	—	1
Bull	—	1	—	1
Calf	2	3	—	5
Ox	1	—	—	1
Camel	1	1	1	3
Canani	1	2	—	3
Ewe	—	1	—	1
Goat	6	9	1	16
Cow	1	3	—	4
Ass	—	2	—	2
Sheep	2	3	1	6
Horse	3	3	—	6
Donkey	2	10	2	14
Cat	3	20	—	23
Mule	—	1	—	1
Unknown	—	1	1	2
	60	234	39	333

RABIES VACCINE

775,000 mls. were issued this year compared with 526,500 mls. issued last year. The amount this year is sufficient to treat 11,071 cases. The animals used for the preparation of the vaccine are goats and the technique is that recommended by the W.H.O. at Muguga Marioli, 1955. As a result of this technique the chances of sepsis were cut out altogether. Anti rabic treatment is decentralised and therefore a certain amount of waste in the vaccine is bound to take place.

LYMPH VACCINE

142 sheep were used for the production of 7,952 grams of pulp with an average of 56 grams per sheep.

Mass vaccination campaigns were launched in several provinces owing to the occurance of small outbreaks of small-pox in the country.

DRY SMALL-POX VACCINE

Opportunity was taken of the availability of an Edwards 30 P-S Centrifugal Freeze - Drying Apparatus, which was recently installed in the Stack Medical Research Laboratories, to prepare dry lymph vaccine on a small experiemental scale.

The method described by L.H. Collier (Journal of Hygiene, 1955, Vol. 53, 76) was adopted with slight modifications to suit the available apparatus and equipment.

Heat resistance test : the vaccine obtained was subjected to various heat resistance tests. The dry vaccine under test was divided into five batches. Batch one was placed in a deep-freeze apparatus ; batch two was placed in an incubator at 37°C and kept there for a week ; batch three was kept at 37°C for a fortnight ; batch four was kept at 37°C for a month and batch 5 was kept at 37°C for two months.

The results of the potency test carried out on these five batches on rabbits are tablulated below :

Batch No.	Titre of Vaccine
1	$\frac{1}{10-9}$
2	$\frac{1}{10-7}$
3	$\frac{1}{10-6}$
4	$\frac{1}{10-5}$
5	$\frac{1}{10-4}$

As it is obvious from the above results this dry vaccine started with extremely high potency which it maintained in the deep-freeze when tested two months later. Even under a temperature of 37°C the dry vaccine retained its potency and could easily pass the required International Standards.

LEISHMANIASIS

The violent epidemic that blew up in 1956 in areas which used to be loosely endemic died out, but small outbreaks of Kala-azar have continued to crop up ever since in both the Fung and Malakal areas. The direct cause of the flare-up of Kala-azar in the Fung area is attributed to the following reason. Until 1954 the population of Southern Fung was living in a closed community and had no contacts with the neighbouring Arab tribes. When restrictions were removed and Rufaa El Hoy and Rufaa El Sharig were permitted to graze their animals in the Southern Fung, the disease attacked the non-immune population and spread very rapidly in the Jum Jum, Surkum, Maban, Uduk and Dinka tribes. The gum-tappers also come from non endemic areas for tapping and collecting gum; they contract the disease and carry the infection to their respective homes in the Southern Fung where people are non-immune and so spread the disease.

The area of Kala-azar was visited several times during the period under review by members of the Stack Laboratory Staff. An interesting observation is the presence of Leishman-Donovan bodies in the lymph glands without manifestation of the disease in several school children in the epidemic areas. The result of examination of two such schools is as follows :

Number	Sex	Enlarged Glands Punctured	Glands Positive L.D.B.
221	Boys	18	18
175	Girls	2	2
		SCHOOL II	
146	Boys	23	20

This interesting finding requires further investigation.

It is to be noted that similar findings have been recorded previously by Angevine and his co-workers in two American Servicemen (American Journal of Medical Society, 1945 Vol. 210, 1338) and again by Bell *et al* in two Servicemen in Cyprus and Malta (British Medical Journal, 1958, 1,740).

As regards treatment several cases relapsed after a second course of Pentostam; a few others could not be cured after the third course. Frank resistance to antimony had been encountered and Lomidine was resorted to with satisfactory results. The dosage of Lomidine is given in 2—3 mgms. per kilogram of body weight.

SCHISTOSOMIASIS

Dr. M.H. Satti in co-operation with Dr. McGown of the University of Khartoum carried out investigations on monkeys in connection with the effect of experimental bilharzial infection on the pulmonary blood-pressure. Several monkeys were infected with *Schistosoma haematobium* and their pulmonary blood-pressures were measured and compared with those of non-infected monkeys. The results of the experiments are not yet to hand.

STAPHYLOCOCCI

An investigation was made on the resistance of staphylococci to antibiotics. Nasal swabs were collected from school children in Khartoum Province, from the nursing staff in Khartoum Civil Hospital and from the Equatoria tribes attending the out-patient department of Juba Hospital.

Although the investigation is still continuing it is interesting to note that staphylococci on the whole are becoming resistant to penicillin therapy, especially so in the strains collected from the nursing staff and from people who frequent attend hospitals. Another interesting point is the preponderance of *B coli* in the nasal samples collected from the Nilotic tribes in the South of the Sudan. This may be explained on their close association with cattle.

POLIOMYELITIS

Few cases were reported to Khartoum Civil Hospital at the end of the period under review. All the cases were in children under the age of four years. The disease was characterised by fever, rigidity of the neck for a period of two to three days and then paresis of one lower limb. Eight such cases were admitted to the Hospital in June 1959.

1958/59

WIDAL REACTIONS

	July	August	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	Total
T.	27	8	9	36	25	40	7	—	7	9	46	17	231
A.	1	—	1	1	3	2	1	—	2	—	3	1	15
B.	8	5	3	8	16	16	3	1	3	2	5	2	72
M.	7	3	5	6	4	11	7	5	5	1	6	4	64
Negative	266	289	240	250	230	310	290	148	186	156	255	218	2,838
Total	309	305	258	301	278	379	308	154	203	168	315	243	3,220

1958/59

BLOOD CULTURE

	July	August	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	Total
T.	4	2	—	6	4	3	6	4	6	3	14	4	56
A.	—	—	—	—	—	—	1	—	—	1	—	—	2
B.	—	—	—	—	—	—	—	—	—	—	—	—	—
M.	—	—	—	—	—	—	—	—	—	—	—	—	—
O.O.	4	6	4	8	3	11	3	9	5	5	20	13	91
Streps.	—	—	—	—	1	2	3	—	—	1	—	—	7
Sterile	50	52	65	59	50	120	100	41	54	61	65	72	789
Contaminated	95	80	85	78	78	93	70	48	58	48	55	61	849
Total ...	153	140	154	151	136	229	183	102	123	119	154	150	1,794

MALARIA

	July	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April	May	June	Total
M.T.	—	74	293	97	15	17	6	—	—	—	—	—	502
B.T.	—	—	—	—	—	—	—	—	—	—	—	—	—
Q.T.	—	—	—	—	—	—	—	—	—	—	—	—	—
D.I.	—	—	—	—	—	—	—	—	—	—	—	—	—
Negative ...	57	220	997	468	168	84	63	58	71	40	53	57	2,336
TOTAL	57	294	1,290	565	183	101	69	58	71	40	53	57	2,838
K.A.	—	—	—	—	1	—	—	—	3	—	—	—	4
R.F.	—	—	—	—	—	—	—	—	—	—	—	—	—
Blood Counts	13	8	16	17	9	15	13	11	10	7	19	17	155
Weil-Felix :													
Positive ...	—	—	—	—	—	—	—	—	—	—	—	—	—
Negative ...	—	—	—	—	—	—	—	—	—	—	—	—	—
TOTAL	—	—	—	—	—	—	—	—	—	—	—	—	—
Hetrophile :													
Positive... ...	—	—	—	—	—	—	—	—	—	—	—	—	—
Negative ...	—	3	1	2	2	4	—	—	4	2	—	1	19
TOTAL	—	3	1	2	2	4	—	—	4	2	—	1	19
MONTHLY TOTAL ...	70	305	1,307	584	195	120	82	69	88	49	72	75	3,016

FAECES

	July	August	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	Total
Flexneri	2	3	1	1	—	2	—	—	—	—	2	2	13
Shiga	—	1	—	2	2	—	—	—	4	4	—	2	15
Alkalecens	—	—	—	—	—	—	—	—	—	—	—	—	—
Ambigium	—	—	—	—	—	—	—	—	—	—	—	—	—
Sonne	—	—	—	—	—	—	—	—	—	1	—	—	1
T.	—	1	1	—	—	—	—	—	—	1	3	—	6
A.	—	—	—	—	—	—	—	—	—	—	—	—	—
B.	—	—	—	—	—	—	—	—	—	—	—	—	—
Amœba	1	—	—	—	1	1	—	—	1	1	—	—	5
Ova	1	2	4	1	3	2	3	—	—	—	—	2	18
Negative	161	135	185	190	241	245	260	53	69	84	158	138	1,919
Total	165	142	191	194	247	250	263	53	74	91	163	144	1,977

1958/59

URINES

	July	August	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	Total
T.	—	—	1	—	—	—	—	—	—	—	—	—	1
A.	—	—	—	—	—	—	—	—	—	—	—	—	—
B.	—	—	—	—	—	—	—	—	—	—	—	—	—
M.	—	—	—	—	—	—	—	—	—	—	—	—	—
Ova	—	—	—	—	—	—	—	—	—	—	—	—	—
Negative	185	214	260	252	262	290	240	131	156	148	208	208	2,514
TOTAL	185	214	261	252	262	290	240	131	156	148	208	208	2,515
Monthly Total... ...	350	357	452	446	509	500	503	184	230	239	371	352	4,493

KAHN TEST

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	July	August	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	Total
Positive...	190	187	188	198	154	216	211	189	254	194	184	137	2,301
Negative	1,297	1,103	1,364	1,135	965	1,151	1,082	972	858	1,004	1,130	1,030	13,091
TOTAL	1,487	1,290	1,552	1,333	1,119	1,367	1,293	1,161	1,112	1,198	1,313	1,167	15,392

SUMMARY OF LABORATORY EXAMINATION 1958/59

Month	Kahn Test	Blood	Stools and Urine	General Bact. and Biochem.	Histo. Pathology	Total
July	1,487	532	350	609	100	3,078
August	1,290	750	357	724	76	3,197
September	1,552	1,702	452	877	71	4,654
October	1,333	1,019	446	782	72	3,652
November	1,119	603	509	711	77	3,019
December	1,367	713	497	811	49	3,437
January	1,293	559	500	689	62	3,103
February	1,161	325	184	703	66	2,439
March	1,112	394	230	667	70	2,473
April	1,200	336	239	475	80	2,330
May	1,313	545	371	693	112	3,034
June	1,167	467	352	727	195	2,908
Total ...	15,394	7,945	4,487	8,468	1,030	37,324

Positive	60
Negative	234
Rabies exam. decomposed	39
Total	333

Vaccine issued during 1958/59		
T.A.B.	136,000	ml.
Anti Rabic	775,000	ml.
Staphylococcus		
Doses of vaccine lymph	2,875,000	ds.
Total of Cholera Vaccinations...	56,400	ml.

1958-59

	July	August	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	Total
C.S. Fluids	33	30	40	55	56	43	32	28	20	29	30	27	423
C. Diph. Positive ...	3	18	20	11	18	25	10	10	10	7	6	2	140
C. Diph. Negative ...	102	180	310	183	197	254	204	265	236	181	164	108	2,384
Virulence Tests ...	—	—	—	—	—	—	—	—	—	—	—	—	—
Sputa Positive ...	3	2	3	2	6	9	3	8	4	3	2	1	46
Sputa Negative ...	17	17	20	26	20	17	30	32	24	10	40	23	276
Gem. Bact.	259	309	333	331	218	331	265	201	138	151	212	199	2,947
Biochm.	169	167	171	174	196	130	125	242	197	100	226	167	2,064
TOTAL	586	723	897	782	711	809	669	786	629	481	680	527	8,280

LIST OF PUBLICATIONS DURING THE YEAR BY MEMBERS OF THE STAFF

Name and Initials of Author	Date of Publication	Title of Article	Title of Journal in which Published	Volume Number of Journal	Page Number of Journal
Haseeb, M.A.	1959	Fatal effect of Heat	J. Trop. Med. and Hygiene	61	280
Haseeb, M.A.	1959	Poliomyelitis in the Sudan	J. Trop. Med. and Hygiene	62	45
Haseeb, M.A. and Halim, A. M.	1959	Observations on Poliomyelitis in the Sudan.	W.H.O. Regional Officer, Alexandria.		
Hickey, B.B.	1959	Malignant epithilial tumours.	Annals of the Royal College of Surgeons of England.	24	303

(b) MEDICAL ENTOMOLOGY

By

M. Qutubuddin

This year also the work in the Section continued on the same lines as during the year 1957/58 *viz* :-

1. Indentification of Anophelines and Culicine larvae and adults collected by the staff of the Section as also those sent from all parts of the country.

2. Determination of sandflies collected by the staff of this Section and those received from the different parts of the country. Sandflies were also collected by the Section from kala-azar area in the Fung, B.N.P., and from Gedaref.

3. Identification of several other insects of medical importance sent to the Section for determination by the Public Health staff in the country.

4. Studies on the density of the adult larvae and pupae of the green *nimitti* (*Tanytarsus lewsi* Freeman) were also continued this year although no treatment of the river with any insecticide was done owing to want of finances. As it was generally observed the incidence of the pest was surprisingly low this year, both at Khartoum and Medani. The figures are under consideration in consultation with Prof. A. W. A. Brown of Canada the ex-W.H.O. Expert, who had helped us in applying D.D.D. at Sennar in 1957.

On two occasions, once in November and a second time in December, 1958, the Medical Entomologist had to visit the Equatoria Province in connection with the prevention and control of yellow fever, details of which are given here-in after.

Susceptibility of mosquitoes and houseflies to various insecticides was studied in the laboratory, details of which will be found below.

Mosquitoes

Mosquitoes received from different parts of the country that were identified, comprised 17 species of Anophelines and Culicines. A list of these species is given in appendix A at the end of this report. In a collection sent from Juba collected in December, 1957, three mosquitoes of the genus *Aedes* and subgenus *Aedimorphus* appeared to resemble none of the known species. It was therefore provisionally labelled as new species and a detailed description of it drawn up and camera lucida drawings of the male terminalia were made and the specimens (one male and one female) with the description sent to the British Museum for confirmation. Mr. P.F. Mattingly of the Museum was kind enough to confirm my diagnosis that it was a *new species*. He characterised the find as an "interesting discovery" since the new species stood as a connecting link between *Aedes ochracens* and the oriental *Aedimorphus* on the one hand and several African groups on the other. The new species was named as Aedes (*Aedimorphus*) *mansouri* sp.n. in honour of Dr. Mansour Ali Haseeb, Head of the Stack Medical Research Laboratories in view of his encouragement and great interest in the work of the Medical Entomology Section. The description was finalised and the paper is now in the press with the Annals and Mag. Nat. History London. The paper entitled "The Inheritance of D.D.T.-resistance in a highly resistant strain of *Aedes aegypti* (L) has already appeared in the Bulletin of World Health Organization, 1958, Vol. 19, 1109—1112.

Mosquitoes collected by two parties, one sent to Kosti in September/October, 1958 and another to Equatoria in November for collection of all insects of medical importance, were also identified. The Medical Entomologist visited the Equatoria Province twice, once in November and a second time in December, 1958, in connection with the possible spread of yellow fever which occurred in Aba, the bordering village in the Belgian Congo, and toured most of the places on the Western bank *viz.*, Juba, Yei, Li Rangu, Yambio, Anzara, Sources Yubu etc. and made recommendations for the control of *Aedes aegtpti* (L) the yellow fever vector. What is needed is to create an *aegtpti* free belt between the enzootic yellow fever in the forests and the rural human population in the villages. The prospects of exterminating *Aedes aegypti* appear to be bright since it has extremely domestic piredilections and breeds exclusively in and around human habitations.

Wadi Halfa where *A. gambiae* has been known to be extinct since 1945, has been free from the malaria vector which is evident from reports of both the Public Health Staff of the region and those of parties from this Section visiting the area. One such party was sent in August, 1958.

Three strains of *Aedes aegypti* (L) are being successfully reared in the hatchery, more about which will be described under the heading " Hatchery."

Sandflies

A preliminary report on the sandflies of Gedaref collected by Dr. M. H. Satti assisted by this Section, was already included in the Annual Report for the year 1957/58. Herewith is appended a more complete account of sandflies from the same area collected by a party from this Section in May and June, 1958. (See Appendix B). The species identified are :—

1. *Phlebotomus antennatus*
2. *Phlebotomus martini*
3. *Phlebotomus clydei*
4. *Phlebotomus africanus*
5. *Phlebotomus schwetzi*
6. *Phlebotomus rodhaini*
7. *Phlebotomus papatasi*
8. *Phelbotomus bedfordi*
9. *Phlebotomus lesleyae*
10. *Phlebotomus adleri*

The list also includes specimens collected by a party from the Section in the Equatoria Province. In all 500 specimens were examined. A part of the collection made by parties sent from this Section in February and March, 1959 to the Kala-Azar endemic area in the B.N.P. has been indentified which comprised mostly *P. antennatus* and P. *clydei*. *P. clydei* is suspected as the vector of Kala-Azar endemic among other places and also in Kenya. It has been observed biting man. It may be mentioned here that Dr. Ibrahim Ahmed Hussein P.M.O.H. B.N.P. was kind enough to attach the parties from this Secton to one of the Kala-Azar Control Units working in the Fung area, but for which the collection of sandflies by this Section would have been difficult owing to lack of transportation of the staff.

The Green Nimitti

It will be remembered that, at a meeting held on 19th Feb., 1958 at the H.Q. Ministry of Health, which was presided over by Dr. Ali Kheir, A.D. Public Health and attended by Prof. Brown, Sayed Khalfalla Babiker, and the Medical Entomologist, it was decided that a second spray be done as early as possible. This was not possible owing to non-availability of the Insecticide. However, the Medical Entomologist recommended spraying of the Nile in November and December and

later in February, 1959 which was also not possible due to lack of finances. It was very interesting to note that the incidence of the pest was remarkably low this season-November, 1958 to April, 1959. This experience of the low incidence observed by everyone in Khartoum and Medani has also been confirmed by our figures of adult and larval catches at Khartoum and of the early stages at Medani. These figures are shown in Appendix C.

Simulium

From the epidemiological studies made by Prof. H. V. Morgan and later on by Prof. Morgan and Dr. A. J. P. Crowden it is clear that *Onchocerciasis* occurs in the Northern Province in the areas along the Nile served by Hamdab dispensary although it does not extend down-stream from Hamdab.

Apart from study of the biology etc., of the pest which this Section intends to make in the coming dry season, it is also proposed to treat the Nile with D.D.T. in Diesel Oil on an experimental basis at a suitable place between the fourth Cataract and Hamdab. Such experiments have been tried in Canada, Alaska, Ghana and Guatemala where some success has been achieved. But the possibility of such a treatment of the river with an insecticide depends upon the availability of funds and several other factors such as the knowledge of the river discharge, the depth, profiles and the width of the river at a given time of the year. For supply of these figures the Section has written to the Egyptian Irrigation Department, Khartoum. On receipt of the data, possibility of control measures willbe explored and if it appears feasible, a scheme will be submitted to the Ministry for consideration.

Hatchery

Laboratory colonies of three strains of *Aedes aegypti* (L) are being maintained very successfully in the hatchery. One of these strains is from El Obeid, Sudan and of the other two, one is from London and the other from Trinidad. These were brought from London by the Medical Entomologist. The Trinidad strain is the D.D.T.-resistant strain, which originated from Trinidad and was found to be 120 times more resistant in the larval stage than the normal *Aedes aegypti*. Subsequently a more resistant colony was obtained from this by selective exposure to D.D.T. in the laboratory of Prof. G. B. Craig working at the U.S. Army Chemical Centre in Maryland. These conducted by me at LSHTM showed it to be 1,000 times more resistant than normal. It is being maintained in our laboratory for comparative tests with various insecticides.

Insecticides

Experiments with various insecticides both Chlorinated Hydro-carbons and Organic Phosphorus Compounds continued in the laboratory. Among the Hydro-carbons tested were D.D.T., Dieldrin, Chlordan and Lindane. The test insect used in the larval pupal, and adult stages was *Aedes aegypti* (L) and with some insecticides the adult housefly. The Phosphorus Compounds tested are :

1. Dipterex
2. Gusathion
3. Metasystox
4. Malathion
5. Delnav (Hercules 528)

Test Methods

The method of measuring susceptibility of mosquito larvae to various insecticides was as follows. Aqueous solutions of soluble insecticides and alcholic suspensions of those not soluble in water were prepared in 250 ml of tap water at

approximately 25—26°C. Batches of 20 early fourth stage larvae were immersed for 24 hours and then examined for mortality. These tests were made with several concentrations (parts per million) and the LC 50 values calculated by plotting the regression lines. In all about 170 such experiments were performed.

For the adult the Busvine-Nash Method (as improvised by the W.H.O.) of exposure of the adult to impregnated papers was employed. About 60 experiments were conducted with the 3 strains with Dieldrin and D.D.T. *No resistance in the Sudan strain was detected.* Difference of action in the two insecticides was observed : *In Dieldrin was noted what is called the delayed action as against D.D.T. in which the percentage Knock Down is much higher.* A new insecticide *Sevin* (*Naphthyl Methyl Carbonate*) by name, an American Carbide Company product, which is *neither a Chlorinated Hydro-carbon nor an Organic Phosphorus Compound was tested with adult Aedes aegypti in* the laboratory with the Busvine-Nash Method. The result was quite promising, and the Carbide Company at Geneva was requested for a supply of test sample in technical form, which is awaited for further detailed tests.

Several experiments were also performed with housefly.

Miscellaneous

(1) *Filariasis in Kordofan Province*

Since it was noted that *Bancroftion Filariasis* occurred in endemic form in and around Kadugli the P.M.O.H., Kordofan was requested to collect samples of blood from diseased persons and their contacts in the area and send them to this Section for identification. Out of 96 such blood smears kindly sent by the P.M.O.H., on examining after staining with Methylene Blue, 20 per cent were found to be infested with *microfilariae* which indicates a high incidence.

(2) A new character for the recognition of nulliarous females of *A. gambiae* was discovered by M.T. Gillies (1956), Bull World Health Organization 451-459. Search was made for the same character by dissecting about 100 females. So far no mating-plug as described by the author was observed in this species.

(3) Crossing experiments between *Aedes aegypt type form i.e.* the darker form and the paler one *queenslandensis* found in Port Sudan were conducted in the laboratory at the instance of Mr. P. F. Mattingly of the British Museum, as it was considered that this will throw light on the very tangled problem of *Aedes aegypti* taxonomy in the country. After the F1 generation was obtained the parent stock died out owing to experimental spraying in the Gezira Area. The experiments will re-start in due course,

(4) Experiments on artificial creation of resistance in *Aedes aegypti* (L) against the Organic Phosphorus Compound Dipterex by selective exposure were conducted in the laboratory. Some 20 generations have been through. There are definite signs of resistance manifesting itself under the pressure of the insecticide.

Training Etc.

One mosquito-man was trained by the Section. Mumaridin from the Wad Medani Civil Hospital came for demonstration.

W.H.O. Malaria Team

At the request of the Team Entomologist eggs, laboratory bred larvae, papae and adult *Aedes aegypti* (L) were supplied several timesto the W.H.O. Team working at Sennar.

MEDICAL ENTOMOLOGY SECTION

Appendix " A "

ANNUAL REPORT

1958 — 1959

Place	Ref. No.	Identification	Remarks
Maridi	2091	*Simulium damnosum*	
Wadi Halfa	2101	*Anopheles pharoensis*	
Dilling	2088	,, *sp.*	
,, ...	2108	*Aedes aegypti*	
Hajar el Mak	2088	*Culex univittatus*	Young
Kadugli...	,,	*Aedes aegypti*	
,, ...	2108	*Anopheles gambiae*	
,, ...	,,	,, ,,	
,, ...	,,	*Culex tigripes*	
Rashad	2088	*Aedes aegypti*	
,, ...	2110	*Culex simpsoni.*	
,, ...	2084	,, *univittatus*	
,, ...	,,	,, *nebulosus*	
,, ...	2088	,, *nebulosus*	
Port Sudan	2109	*Aedes vittatus.*	
El Obeid	2106	*Culex tigripes.*	
Hajar el Dom ...	2110	,, *decens.*	
,, ,, ,, ...	,,	,, *univittatus*	
Kassala	2104	,, *fatigans*	
,, ...	,,	*Aedes metallicus*	
,, ...	,,	,, *vittatus*	
,, ...	,,	*Culex fatigans*	
,, ...	,,	*Aedes metallicus*	
,, ...	,,	,, *aegypti*	
,, ...	,,	*Anopheles coustani*	
Wau	2097	*Culex ethiopicus*	
,, ...	2112	*Simulium damnosum*	
Juba	2058	*Anopheles rhodisiensis*	
,, ...	,,	*Aedes mansouri*	New species
,, ...	,,	*Anopheles coustani*	
Torit	2102	*Aedes aegypti*	
El Kujuriya	2089	*Culex univittatus*	
Tasba	2084	,, *duttoni*	
Lakarna	,,	*Aedes aegypti*	
Abu Gebeiha	,,	*Anopheles pharoensis*	
,, ,, ...	2110	*Culex decens*	
Kawnaro Jebel ...	2084	*Anopheles pharoensis*	
Tabeldiya	2106	*Culex nebulosus*	
Rahad	2108	,, *duttoni*	
,, ...	2110	,, *simpsoni*	
,, ...	,,	*Anopheles gambiae*	
Gebeilat	2108	*Culex duttoni*	
Tagali	,,	,, *tigripes*	
Koro	,,	,, *tigripes*	
El Abbassiya	,,	*Anopheles gambiae*	
A'Karshola	,,	*Aedes aegpyti*	
,, ...	2110	*Culex duttoni*	
,, ...	,,	,, *decens*	
Tagamilh	2108	*Aedes aegypti*	
El Moreib	,,	,, *aegypti*	
Taise	,,	,, *aegypti*	
El Awe	,,	,, *aegypti*	
Umm Brembeita ...	,,	,, *aegypti*	
,, ,, ...	,,	*Anopheles gambiae*	

PLACE	Ref. No.	Identification	Remarks
Kalogi	2108	*Aedes aegypti*	
,, ...	,,	*Culex duttoni*	
,, ...	,,	,, *univittatus*	
,, ...	,,	,, *decens*	
Nitl	,,	*Anopheles gambiae*	
Tartar	,,	*Culex tigripes*	
El Lukha	2110	,, *univittatus*	
Buram	,,	,, *univittatus*	
Kunda	,,	,, *decens*	
,, ...	,,	,, *univittatus*	
Sambo	,,	,, *univittatus*	
El Mar	,,	*Anopheles gambiae*	
,, ,, ...	,,	*Culex univittatus*	
Tabasa	,,	,, *decens*	
Heiban	,,	,, *decens*	
Korongo	,,	*Anopheles gambiae*	
Mandi	,,	,, ,,	
El Mugsar	,,	*Aedes aegypti*	
Umm Garfa ...	,,	,, ,,	
Khor Gadim	,,	*Culex duttoni*	
,, ,, ...	,,	,, *tigripes*	
El Saiya	,,	*Aedes aegypti*	
Bara	,,	,, ,,	
Ban Gadid	,,	*Culex nebulosus*	

MEDICAL ENTOMOLOGY SECTION

ANNUAL REPORT — APPENDIX (B)

1958/1959

Date	Name of Villages	No. of Traps	*P. ant.*	*P. martini*	*P. clydei*	*P. african.*	*P. schwetzi*	*P. rod.*	*P. papat.*	*P. bedfodi*	*P. lesleyae*	*P. adleri*
			M F	M F	M F	M F	M F	M F	M F	M F	M F	M F
	Sanban	3	6– 2	—	8– 0	—	—	—	—	3– 1	—	—
	Deim Bakr	4	2– 3	—	7– 3	—	—	—	—	—	1– 0	—
10.5.58	Twareb	3	3– 0	—	—	4– 0	—	—	—	9– 0	—	—
7.5.58	Wadi El Shajra	4	—	—	6– 6	1– 2	2– 0	—	0– 1	3– 3	1– 2	—
4.5.58	Gedaref East	23	25–33	—	40–25	3– 3	1– 1	1– 0	—	3– 1	2– 3	4– 3
21.1.58	Gedaref Railway Station ...	6	2– 1	—	13– 6	—	—	—	—	—	—	—
12.1.58	Salamat el Bei	3	—	—	13– 4	0– 1	—	1– 0	—	—	—	—
8.5.58	Doka	8	6– 3	—	14– 4	—	4– 1	—	—	0– 5	—	0– 2
	Juba	16	13–49	1– 1	1– 4	4– 6	5– 4	—	—	—	—	—
17.1.58	Wadi Arud	6	5– 7	—	14– 8	—	1– 0	—	—	—	—	—
		76	26–98	1– 1	115–60	12–12	13– 6	2– 0	0– 1	18–10	4– 5	4– 5

Abbreviations : P. rod. :— *Phlebotomus rofhaini*
P. papat :— ,, *papatasi*
P. ant. :— ,, *antennatus*.

MEDICAL ENTOMOLOGY SECTION

Appendix "C"

ANNUAL REPORT

1958 — 1959

CHIRONOID LARVAE CATCHES

WAD MEDANI

Place	Date	Larvae	Pupae	Remarks
Wad Medani	11.1.59	—	2	2½ hrs. (5 samples at 30 mins.)
,, ,, ...	19.1.59	—	1	,, ,, ,, ,, ,, ,, ,,
,, ,, ...	5.2.59	—	3	,, ,, ,, ,, ,, ,, ,,
,, ,, ...	,,	—	2	,, ,, ,, ,, ,, ,, ,,
,, ,, ...	9.2.59	—	1	,, ,, ,, ,, ,, ,, ,,
,, ,, ...	10.2.59	—	3	,, ,, ,, ,, ,, ,, ,,
,, ,, ...	19.2.59	—	2	,, ,, ,, ,, ,, ,, ,,
,, ,, ...	21.2.59	—	1	,, ,, ,, ,, ,, ,, ,,
,, ,, ...	25.2.59	—	3	,, ,, ,, ,, ,, ,, ,,
,, ,, ...	2.3.59	—	6	,, ,, ,, ,, ,, ,, ,,
,, ,, ...	3.3.59	1	2	,, ,, ,, ,, ,, ,, ,,
,, ,, ...	4.3.59	—	4	,, ,, ,, ,, ,, ,, ,,
,, ,, ...	,,	—	2	,, ,, ,, ,, ,, ,, ,,
,, ,, ...	7.3.59	—	2	,, ,, ,, ,, ,, ,, ,,
,, ,, ...	,,	—	1	,, ,, ,, ,, ,, ,, ,,
,, ,, ...	9.3.59	1	8	,, ,, ,, ,, ,, ,, ,,
,, ,, ...	,,	—	2	,, ,, ,, ,, ,, ,, ,,
,, ,, ...	11.3.59	—	1	,, ,, ,, ,, ,, ,, ,,
,, ,, ...	14.3.59	—	1	,, ,, ,, ,, ,, ,, ,,
,, ,, ...	17.3.59	—	2	,, ,, ,, ,, ,, ,, ,,
,, ,, ...	18.3.59	—	1	,, ,, ,, ,, ,, ,, ,,
,, ,, ...	19.3.59	—	1	,, ,, ,, ,, ,, ,, ,,
,, ,, ...	23.3.59	—	2	,, ,, ,, ,, ,, ,, ,,
,, ,, ...	24.3.59	—	3	,, ,, ,, ,, ,, ,, ,,
,, ,, ...	25.3.59	—	3	,, ,, ,, ,, ,, ,, ,,
,, ,, ...	28.3.59	—	1	,, ,, ,, ,, ,, ,, ,,
,, ,, ...	,,	—	1	,, ,, ,, ,, ,, ,, ,,
,, ,, ...	29.3.59	1	1	,, ,, ,, ,, ,, ,, ,,
,, ,, ...	3.4.59	—	1	,, ,, ,, ,, ,, ,, ,,
,, ,, ...	5.4.59	—	1	,, ,, ,, ,, ,, ,, ,,
,, ,, ...	6.4.59	—	1	,, ,, ,, ,, ,, ,, ,,
,, ,, ...	7.4.59	—	1	,, ,, ,, ,, ,, ,, ,,
Khartoum	21.2.59	—	5	1½ hrs. (3 samples at 30 mins.)
,, ...	22.2.59	—	1	,, ,, ,, ,, ,, ,, ,,
,, ...	23.2.59	—	2	,, ,, ,, ,, ,, ,, ,,
,, ...	,,	—	2	,, ,, ,, ,, ,, ,, ,,
,, ...	24.2.59	—	3	,, ,, ,, ,, ,, ,, ,,
,, ...	,,	—	4	,, ,, ,, ,, ,, ,, ,,
,, ...	25.2.59	—	1	,, ,, ,, ,, ,, ,, ,,
,, ...	,,	—	3	,, ,, ,, ,, ,, ,, ,,
,, ...	26.3.59	—	1	,, ,, ,, ,, ,, ,, ,,
,, ...	27.3.59	—	1	,, ,, ,, ,, ,, ,, ,,
,, ...	,,	—	1	,, ,, ,, ,, ,, ,, ,,
,, ...	28.3.59	—	4	,, ,, ,, ,, ,, ,, ,,
,, ...	29.3.59	2	1	,, ,, ,, ,, ,, ,, ,,
,, ...	30.3.59	—	2	,, ,, ,, ,, ,, ,, ,,
,, ...	,,	—	6	,, ,, ,, ,, ,, ,, ,,
,, ...	31.3.59	—	5	,, ,, ,, ,, ,, ,, ,,

7 days from 10.1.59 to 16.1.59 1½ hours sampling (3 samples at 30 minutes) no larvae or pupae were found in Khartoum.

MEDICAL ENTOMOLOGY SECTION

Appendix " D "

ANNUAL REPORT

1958 — 1959

ADULT CATCHES OF GREEN NIMITTI AT KHARTOUM

Date	South Veranda West Weight in Grm. Wellcome Labs. N. Dish	South Veranda East Weight in Grm. Wellcome Labs. N. Dish
21.2.59	0.536	0.844
22.2.59	0.675	0.877
23.2.59	0.397	2.765
24.8.59	0.475	2.781
25.2.59	1.45	0.785
26.2.59	0.21	1.05
28.2.59	1.5	1.96
1.3.59	0.215	0.260
2.3.59	1.145	3.909
3.3.59	0.480	0.456
4.3.59	0.2966	0.084
5.3.59	0.0760	0.5390
7.3.59	1.7790	1.4252
8.3.59	0.0860	0.5640
9.3.59	0.6650	3.8355
10.3.59	1.6520	2.0925
11.3.59	0.0280	0.0260
12.3.59	XXXXXX	XXXXXX
14.3.59	0.215	0.36
15.3.59	0.4240	1.122
16.3.59	Nothing	Nothing
17.3.59	0.0212	0.0304
18.3.59	0.553	0.7933
19.3.59	0.4164	0.2380
21.3.59	0.85	15.
22.3.59	3.2	22.5
23.3.59	0.143	0.263
24.3.59	0.85	1.0
25.3.59	0.25	1.2
26.3.59	0.417	1.7
28.3.59	Nothing	0.1342
29.3.59	0.03	0.08
6.4.59	0.3240	1.1240
7.4.59	5.2	9.5
12.4.59	5.4	28.7
13.4.59	0.12	4.6
14.4.59	0.32	1.0
15.4.59	0.5	3.0
16.4.59	2.2	7.8
18.4.59	0.1	0.5
19.4.59	Nothing	Nothing
20.4.59	,,	,,
21.4.59	,,	,,
22.4.59	,,	,,

LIST OF PUBLICATIONS DURING THE YEAR BY MEMBERS OF THE STAFF

Name and Initials of Author	Date of Publication	Title of Article	Title of Journal in which Published	Volume Number of Journal	Page Number of Journal
1. Mohamed Qutubuddin	1958	The inheritance of DDT resistance in a highly resistant strain of *Aedes Aegypti* (L).	Bulletin of World Health Organization.	19	Pp. 1109-1112
2.— Do.—	1959	A new species of Aedimorphus (Diptera : Culicidae) from Sudan Republic	Annals and Magazine of Nat. History	In the press	In the press

(c) THE WELLCOME CHEMICAL LABORATORIES

By

Abdel Hamid Ibrahim

1. Staff

(i) Abdel Hamid Eff. Ibrahim was promoted to the post of Government Analyst as from 29.6.1958.

The Government Analyst was awarded a three months fellowship by the World Health Organization on March, 28th., 1959. He spent 75 days in London, United Kingdom, 4 days in Geneva, Switzerland and 11 days in Cairo, United Arab Republic. His Fellowship Courses covered the fields of forensic science, pharmaceutical and dangerous drugs control, pesticide hazards and environmental sanitation.

(ii) Rifaat Eff. Butros who is towards the end of his Study leave in the United Kingdom is expected back towards the end of July, 1959. Since passing his M.Sc. Degree in July, 1958, Rifaat Eff. has had extensive laboratory training in Forensic science and Toxicology. After his return we expect to expand our forensic section and bring it up to date so as to deal properly and promptly with all cases. The police will be encouraged to make full use of such facilities.

(iii) Mubarak Eff. Ali Karrar, who is also on a Study leave at Nottingham University, United Kingdom, will be sitting for his final for his Honours Degree in June, 1960. If successful he may proceed on a post graduate course in Pharmaceutical Chemistry.

(iv) Ahmed Eff. Abdulla Nagi was promoted to Senior Technical Assistant.

(v) The services of temporary clerk Ibrahim Eff. Hamid were terminated.

(vi) The salary group of unclassified Laboratory Attendants was revised and two new Senior groups were established. This will make possible promotion of Laboratory Attendants within these groups.

Looking at the staff list it is obvious that the Laboratories were being run far below their full establishment. This has laid a heavy burden on all the staff who, in most cases, had to give up their annual leaves to cope with the increasing routine work. There was no time to carry out any research work during the year except the part mentioned at the end of this report.

It is expected, however, that after the return of Rifaat Eff. Butros the professional staff position will improve. We also expect to fill most of the vacant posts during the next year.

2. General

(i) *Premises*

One feature has become obvious in the present premises of the Laboratories, and that is lack of space. The position will be worse after the return of our officials from abroad, and the increase in the number of massive equipment acquired. It is proposed to extend the premises on the first floor of the Chest Hospital when the latter moves to its new premises.

The electrical wiring system in the laboratories has been completely replaced with the lead, neutral, earth system. Over 20 new plug points have been installed for new electrical equipment.

(ii) *Equipment*

One air cooler was installed in the dark room for photographic development and all the work in which a lower temperature is specified *e.g.* specific gravity, polarimetry, viscosity. etc. Also most of the volatile organic solvents are being stored in that room.

A Medium Quarts spectrograph has been acquired which will replace the one which is over thirty years old. This is expected to give valuable service in forensic and metallurgical work.

A number of standard textile testing equipment has arrived recently and these have not yet been installed.

Toxic gases testing equipment has also been acquired and tests in factories may be started next year.

(iii) *Library* :

65 new books and 38 British standard specifications booklets have been acquired. Subscriptions to two periodicals have also been started. The number of free publications, reports and reprints have vastly increased especially after the contacts established by the Government Analyst on his Fellowship visits abroad.

(iv) *Routine* :

Approval was obtained from the Ministry of Finance to apply the revised analytical fees as from 1.8.1959. It was also decided to charge all Government Departments for work done for them in the Laboratories.

Consequently the clerical work in the office was streamlined to ensure accuracy and speed. New sample books and claim books were introduced and measures taken to organise accounts.

ANALYTICAL REPORT

1. The following table shows the number of samples received in different categories during the last two years :—

	1958/59	1957/58
Water and Sewages	319	465
Foods	388	265
Drugs and Pharmaceuticals	48	70
Clinical Specimens	30	8
Toxicological Specimens	183	137
Forensic Specimens	13	47
Edible Oils, Seeds and Oil Cakes	925	581
Damaged Materials	186	341
Miscellaneous	156	225
TOTAL	2,248	2,139

The following table gives the number of samples submitted by Government Departments and others :—

	1958/59	1957/58
Ministry of Health	541	304
,, ,, Agriculture	83	41
,, ,, Animal Resources	29	18
,, ,, Commerce, Industry and Supply ...	6	2
,, ,, Communications	26	32
,, ,, Education	0	0
,, ,, Finance and Economics	29	27
,, ,, Mineral Resources	0	15
,, ,, Social Affairs	1	0
,, ,, Stores and Equipment	18	88
,, ,, Works	207	185
,, ,, Mechanical Transport Dept.	0	3
Museums	0	1
Sudan Army	3	8
Sudan Police	1	32
Local Authorities	6	21
Khartoum University	6	10
Sudan Gezira Board	61	46
Equatoria Projects Board	0	0
Province Governors	5	2
Commercial Firms and Others	1,152	1,104

The analytical fees for commercial work totalled LS. 2,958.584 m/ms. compared with LS. 2,178.035 m/ms. for last year.

Fees from Government Departments apart from the Ministry of Health, totalled LS. 1,659.035 m/ms.

2. Water and Sewages

Samples of water and sewages were received from the following sources :—

	1958/59	1957/58
Ministry of Health	70	165
Drilling Engineer, Ministry of Works	188	185
Sudan Gezira Board	4	18
Khartoum Main Drainage Contractors	0	12
Other Sources	57	85
TOTAL	319	465

This marked decrease in samples was mainly due to decrease in samples received from Public Health Authorities.

The following table gives details of some of the unusual waters received during the year.

No.	Source	Remarks	p.p.m.
D. 36	Dueim, Well	Total solids	22,900
		Total Hardness as CaCO	4,750
		Sulphates as SO4	5,280
		Chlorides as Cl	8,200
		Nitrates as N.	174

No.	Source	Remarks	p.p.m.
D. 226/30	Dueim Villages		
	Shadida, Well	Ammoniacal N.	2,60
	Galaa, Well	,, ,, ...	5,00
	El Gareen, Well	,, ,, ...	5,60
	El Audiat, Well	,, ,, ...	4,60
D. 308	El Zafir, Bore 810	Total Solids	13,250
		Sulphates as SO4	1,870
		Chlorides as Cl	5,700
D. 311	Abu Hawa, Bore 808	Total Solids	22,850
		Sulphates as SO4	3,260
		Chlorides as Cl	10,600
D. 347	Marra, Well	Nitrate N.	250
D. 444	Hafayer, Well	,, ,, ...	85
D. 501	Shendi, Bore	Total Solids	3,280
		Total Hardness as CaCo3	20
		Total alkalinity as CaC03	1,800
		Na2C03 alkalinity as CaC03	580
		NaH C03 alkalinity as CaC03	1,220
D. 582	Mikheizina, Bore 882	Nitrate N.	170
D. 614	Sinkat, Well	,, ,, ...	100
D. 841	Um Dama, Well	,, ,, ...	430
D. 1086	Abu Zabad, S.R. Bore No. 4	,, ,, ...	70
D. 1318	Niweila, Well	,, ,, ...	870
D. 1432	Hillat El Haggag, Well	,, ,, ...	870
D. 1579	Gedaref, Bore 921	Total Solids	2,680
		Total alkalinity as CaC03	2,440
		Excess alkalinity as Na2C03	1,803
D. 1873	Nahud, Well	Nitrates N.	500
D. 2006	Wad Amour, Well	Total Solids	12,600
		Total Hardness as CaC03...	4,400
		Nitrates as N.	800
D. 2017	Gedaref, Bore 974	Total Solids	2,840
		Total alkalinity as CaC03	2,520
		Excess Alkalinity as Na2C03	2,030
D. 21110	Khur Shalatien, Well	Total Solids	14,400
		Total Hardness as CaC03...	5,500

Nitrates continue to be the main problem in borehole waters intended for human and animal consumption. Although there are no reports of cases of the effect of waters of high nitrates on humans ; cases of poisoning to cattle are reported every year. For example sample D. 1873 was taken from a well after it was noticed that the water caused death to cattle. Meanwhile it was decided to keep the maximum limit of 50 p.p.m. Nitrate N as it is, and to condemn any water containing more than that limit until more information is gained on the effect of high nitrates in water on human beings.

Another problem that has shown up recently is high sodium carbonate and bicarbonate alkalinity in water. This problem is affecting the Gedaref area where these is an urgent need of water.

It all started when water from a bore-hole in a soldiers camp at Shendi was reported to have given rise to a considerable number of cases of nephritis (see D. 501 above). The water had an excess alkalinity of 1890 p.p.m. as Na 2 Co3 and that seemed to be the only cause of the ailment. Hence it was decided to make a maximum limit of excess alkalinity of 600 p.p.m. as Na 2 Co 3 irrespective of the PH of the water.

Sewages

No sample from Khartoum main Drainage Scheme has been received during the year. It is, however, expected that the influx of samples from sewage and industrial effluents will shortly start as more and more connections are made to the drainage system.

Foods

The following samples were received during the year :—

	1958/59	1957/58
Official Samples	285	174
Other Samples	102	91
TOTAL	387	265

There is a marked increase in samples submitted by Public Health Authorities.

The following table gives a summary of the different types of foods and drinks analysed :—

DESCRIPTION	Number of Samples
Alcoholic Drinks	21
Beans	4
Biscuits	4
Bread and Kisra	8
Butter and Semn (Ghee)	6
Cereal grains	41
Cheese	2
Coffee	5
Dates	6
Flour, Wheat	54
Flour, Dura	6
Fruits, Canned	16
Honey and Syrups	5
Jams and Marmalade	3
Lentils	61
Milk, condensed	3
Milk, dried	9
Sardines	3
Sausages	2
Squashes	6
Sugar	32
Sugar beet	42
Sweets	3
Tea	2
Tomato puree and sauce	22
Other foods	23
TOTAL	388
RAW MILK :	
Official samples	57
Other samples	5
TOTAL	62

Out of the 57 official samples received 18 samples were adulterated by added water. If it is born in mind that these samples are submitted by Public Health Authorities in the Three Towns very occasionally, it shows that considerable adulteration of milk is taking place probably all over the country.

Wheat Flour

The main problem with regard to wheat flour was heavy infestation with weevils and larvae. This continued to be a feature of most of the imported flours.

Dura and Dura Flour

In two cases of condemned Dura flour the samples were found to contain enormous amounts of smut spores, " Sphacelatheca Sorghi ", known as Sueid.

In some of the other cases the condemned samples of grain and flour were heavily infested with weevils and larvae. But in most cases the main trouble was excessive dirt, clay, sand, organic matter etc. In one case the sand content of the flour was 9.8%.

In one case a sample of Dura grain which was being exposed for sale in the market contained 90 p.p.m. of Benzen Hexachloride. This case is the first of its kind in the country, as normally farmers and merchants never use pesticides in stored Dura grain in " Matmura's."

Sugar

The samples condemned were in most cases damaged by water and have undergone considerable inversion. Others were soiled, containing a lot of foreign matter.

Honey

In one case, what was sold as pure Bee Honey, was found to be adulterated with about 40 per cent sugar syrup.

Squashes

Most of the samples submitted were condemned for being mouldy and showing considerable growth of wild yeast.

Tinned Food

Practically all samples of tomato puree tins showed blowing, leakages and corrosion. In many cases also all inferior quality tins of puree which are rarely bought by customers had their labels removed so that the well known inferior brand could not be detected by purchasers, which was a violation of the Weights and Measures Ordinance.

Alcoholic Drinks

In the case of sherries, restriction of import has led to widespread adulteration with water, Unfortunately with regard to sherry there is only a legal maximum limit for alcohol but no lower limit. Most diluted sherries contained about 12 per cent. v/v of alcohol.

Arsenic contaminated wines and sherries seem to have completely disappeared.

Tinned Milk

Sweetened condensed milk of a dark brown colour and charry odour was presented for analysis. The milk was of a good quality and consistency but seemed to have been overheated during preparation.

Semn (Ghee)

One one sample supposed to be pure semn was found to contain no milk fat. It was hydrogenated cooking fat.

4. Drugs and Pharmaceuticals

The number of samples presented in this category has been greatly reduced. Very few drugs and pharmaceutical preparations were presented by the Medical Stores. Almost all the samples presented were of preparations containing dangerous drugs or alcohol sent by the Customs Department for checking drug or alcohol content ; and from private drug stores for checking specifications. The following samples were some of those received :—

1. The Medical Stores presented samples of arsenical drugs which have exceeded their expiry dates. Chemical tests showed no deterioration and the samples were sent to Stack Laboratories for Biological Testing.

2. Quinine Hydrochloride and Procaine Hydrochloride ampoules were found to have changed colour considerably and hence condemned as unfit for medical use.

3. Various drugs, preparations, injections and tablets were tested for private drug stores for indentity, purity and dosage.

4. A spray inhaler preparation for asthma of unknown composition was found to contain 0.4 per cent. of adrenaline only.

5. Tablets of Cascara Sagrade and lodochloroxy quinoline failed to pass the specified disintegration tests in their monographs.

6. A sample of glycerine did not comply with the British Pharmacopoeia standards.

7. A sample of Coloroxylenol Solution supposed to contain 3.5 per cent. of the active principle was found to contain 3.3 per cent.

There was also a number of drugs connected with toxicological cases and these are included in the toxicological Report.

5. Clinical Specimens

These consisted of :—

8 samples of stools for split and unsplit fat estimation ;

7 samples of blood for uric acid estimation ;

5 samples of blood for calcium, phosphorus and chloride estimation ;

3 samples of blood for alcohol estimation ;

1 sample of urine for examination for mercurochrome ;

1 sample of urine for examination for Abavit B ;

1 sample of urine for examination as to nature of green colour (found to be methylene blue) ;

1 sample of urine for examination for lead ;

1 sample of a ureter stone ;

1 sample of bladder stone ;

1 sample of human breast milk.

The only clinical work done in these laboratories is the work connected with forensic cases or that which could not be done in the Stack Laboratories.

In this connection many standard solutions and reagents needed for this type of work were prepared for the Stack Laboratories throughout the year.

6. Toxicological Specimens

These include all specimens, forensic or otherwise, tested in connection with poisoning cases to humans or animals. It also include all drugs presented by police authorities.

The following are some of the cases examined :—

(i) Vials of Procaine Penicillin confiscated by the police were found to contain a solution of vitamin B complex.

(ii) A solution given to a baby for treatment of urine retention caused its death. The solution was found to be 97 per cent Acetic Acid.

(iii) One man died and several people suffered from severe poisoning symptoms at Sennar Junction, after consuming a powder found to be that of Datura seeds.

(iv) A number of goats died after consuming grass containing what was suspected as a rat poison. The poison was found to be Zinc phosphide.

(v) A case of poisoning at Singa on consumption of seeds identified as Datura seeds.

(vi) Several people at Dilling were poisoned and one died after consuming dura flour. The flour was found to be heavily infested with smut spores (Sueid).

(vii) A case of attempted suicide by Doriden (Ciba). The Doriden was confirmed in the stomach wash.

(viii) Dura plant feed (gasab) caused the death of one cow and three goats. The gasab was found to contain appreciable amounts of cyanides.

(ix) Many cases of poisoning were attributed to corms of members of the liliaceae. These are reputed to contain glycosides but this has not been confirmed.

(x) Wild yam taken by three people caused their death at Li-Rangu. The Yam was found to contain strychnine.

(xi) A woman died after taking a procaine penicillin injection. The vial and syringe were found to contain an appreciable amount of picric acid solution. This came from a piece of gauze, soaked in picric acid solution in which the syringe was being kept.

(xii) 3 dogs guarding a factory at Wad Medani were found dead after eating meat given to them by burglars. The P.M. Specimens and meat were found to contain strychnine.

(xiii) A few cases of milk poisoning were attributed to heavy contamination with Zinc.

(xiv) Castor oil seed cake caused the death of 4 animals and severe poisoning to a man. The cake was confirmed as that of whole castor oil seeds which is normally poisonous.

(xv) Casava root that caused the death of one person was found to contain cyanides.

As to Dangerous Drugs, 16 of the suspected samples presented by the police were identified as " Bango ", local Hashish blend ; and 2 as raw opium.

7. Forensic Specimens

Here are some of the Forensic cases examined, apart from the toxicological cases already mentioned.

(1) A black powder used as Kuhul (beauty speciality usually of Antimony for eye-lashes and eye-brows) was found to be powdered dry battery fillings.

(2) A pistol and two cartridges were presented by the police. The cartridge content was found to be a mixture of a nitro-explosive, wood shavings and a lacrimator. It was obvious that the pistol was used for dispersing the lacrimator and was not a fatal weapon.

(3) A pair of Higgils (feet ornament) supposed to be pure silver were found to be an alloy of about 43 per cent silver, 54 per cent copper and 3 per cent iron.

(4) A damaged aircraft flap was examined for cause of damage. The damage was alleged to have been caused by a collision with a donky during decent. Examination showed no trace of animal tissue or body fluids, and the nature and extent of damage indicated collision with a rough, very strong, anchored structure *e.g.* a rock.

(5) A number of Import Licences were examined in connection with a money smuggling case. Most of these showed mechanical and chemical erasures. Chemical erasures showed conspicuously under ultra-violet light and helped a lot in revealing the method use in smuggling foreign currency out of the country.

(6) A five piastre Sudanese coin suspected as counterfeit was presented for examination by the Currency Board. Although the coin had different dimensions compared with the original coin it was found to be of the same alloy. Hence it was a genuine coin of a different cast.

8. Edible Oil Seeds and Oil Cakes

The following samples were submitted for analysis for export purposes :—

	1958/59	1957/58
Cottonseed	89	280
Groundnuts	527	89
Sesame seeds	107	25
Safflower seeds	0	0
Castor seeds	64	28
Edible Oils	23	40
Oil Cakes	112	119
Dukhn	1	0
Melon seed	2	0
TOTAL	925	581

There is an enormous reduction in the number of cottonseed samples but an equivalent increase in the number of groundnut and sesame seed samples.

9. Damaged Materials

Damaged samples presented for examination in connection with insurance claims totalled 186 compared with 341 samples last year. This is mainly due to restriction of imports during the year.

10. Miscellaneous Samples

The following table shows the various types of samples examined in this category :—

DESCRIPTION	Number of Samples
Building materials	4
Disinfectants	2
Essences	6
Gums	15
Inks	3
Insecticides	34
Methylated Spirits	4
Minerals	23
Oxygen Cylinders	3
Paints and Polishes	6
Plastic materials	2
Soaps	35
Tobacco	2
Other Samples	17
TOTAL	156

Samples in this category have shown a significant drop in the last two years. This is mainly due to the drop in the number of textile samples tested which dropped from 102 samples last year to nothing this year. This was also a result of restriction on textile imports into the country.

RESEARCH REPORT

This year no new problems were investigated on a proper research scale. The daily routine proved too much for the staff present ; and most of these had to give up their annual leaves to cope with the routine.

Nevertheless the following work was pursued or continued.

(1) Composition of the Nile at Khartoum.

The regular analysis of monthly water samples taken from Khartoum Mains Supply and the Blue Nile and White Nile at Khartoum was continued. Reprints of the results published in our last Annual Report were made and a large number of these were sold to Industrial and Agricultural concerns.

(2) Recovery of Alcohol from Election Marks Solution.

Most of the Developer solutions used in the last General Elections were recovered and the recovery of the alcohol used in their preparation started. About 200 litres of pure 80 per cent alcohol were recovered which satisfied most of the laboratories needs. Another 100 litres are expected to be prepared from the remaining Developer.

The residue after distillation is being kept to start separating its Pyrogallol content next year.

(3) Nitrates in Potable Waters.

Data on the problem of high nitrates in water are being recorded. Unfortunately the Ministry of Animal Resources has not started any watering experiments on animals yet. Also no reports were received from Public Health Authorities on the effect of such waters on humans, and only few reports on fatal effect on cattle were received during the year.

(4) Glossary of Folk Medicines of Vegetable Origin.

The table given in the Appendix in the Annual Report was compiled from the Graphic Museum records of registered specimens, and hence does not include all reported medicinal plants in the Sudan.

The data shows the effect and use of these vegetable remedies as used by the people.

REPORTS AND PUBLICATIONS

There was an even bigger demand on the advisory service of the Laboratories during the year. Help and advice were extended to many Government Departments and private concerns intending to start industries of sugar, pharmaceuticals, hydrogenated oils, tanning, tooth pastes, paper, pencils, chinaware, paints, dyes, polishes, inks, perfumery, textiles, butter, alcoholic drinks, industrial spirits, distilled water, water supplies, swimming pools, insecticides and various other problems. The Laboratories also ran an efficient service of supplying various mixtures and solutions to Government Departments and Industrial concerns.

Publications

The Annual Report of the Government Analyst for the year 1957/58 was published.

Reprints were made of the results of monthly water analysis of water samples from Khartoum Mains Supply, the Blue Nile and the White Nile at Khartoum. These were supplied or sold to over 40 departments or private applicants and proved very useful.

CHAPTER IX

SCHOOL OF HYGIENE

School Facilities

The School occupies its own buildings which has the great advantage of being next door to the Graphic Health Museum. The Graphic Health Museum which is also directly supervised by the Principal of the School of Hygiene, which is extensively used by the students, provides very useful material for demonstrations and other visual studies.

Staff

(1) Principal.

(2) Asst. Principal.

(3) Public Health Officer.

(4) Clerk.

Board of Studies

The Board of Studies, in association with the School which consists of the A/Director (Public Health) as Chairman, Principal School of Hygiene as Secretary, Chief Public Health Inspector and A/Principal School of Hygiene as members, have held four meetings during the year to discuss the different aspects of the School Policy.

Basis of Education for School

The basis of education on which training is required is that of the 4th year secondary standard.

Asst. Sanitary Overseers

They are Local Government officials and their training is from a curriculum prepared by the Principal School of Hygiene. Their training outside is undertaken by the Local Public Health Inspectors and those in Khartoum Province receive an organised course of training in the School of Hygiene.

Sanitary Overseers

They are Ministry of Health officials and candidates are drawn from the A/ Sanitary Overseers category by examination.

On selection the candidates receive a six months' training in the School of Hygiene, which includes an adequate number of demonstrations to supplement lectures.

Public Health Officer Students

The basic education now required is that of the Secondary standard. Candidates for the School are required to be from those who have completed their Secondary education and the selection is made by an interview.

The students take a 3 years' course at the end of which they must pass the R.S.H. examination before being awarded the qualifying Certificate.

The Curriculum is Briefly as Follows:—

1*st. Year*

General Science, Building Science, Drawing and Construction, Levelling and Geometry. Given at Khartoum Technical Institute.

2*nd. Year*

Entomology and Pest Control, Helminthology, Protozoology, and Bacteriology, Water Supply and Disposal of Waste Matter.

3*rd. Year*

Food and food control, meat inspection, milk food production and manufacture, housing, Urban and Rural planning, communicable diseases, school health, prison health, quarantines, airports and seaports, central statistics, sanitary law, relations between Councils and Public Health staff, notes on training within industries.

The necessary demonstrations which supplement the lectures include visits to water works, food production places, schools, prison manufactures and factories of Public Health interest, and certain councils meetings.

SCHOOL REPORT FOR THE PERIOD

1st. JULY, 1958 — 30th JUNE, 1959

During the year 25 students were under training in the following classes :—

2nd year: 15 students—3 of them from Aden Municipality.

3rd year: 10 students.

The 3rd year students took the Royal Society of Health examination on the 28th. Feb. and 2nd, 4th. and 7th. March, 1959.

The examination which was held in Khartoum, was conducted by Dr. Abdella Omer Abu Shamma, Dr. Mansour Ali Haseeb, Sayed Abdel Rahman El Agib and Sayed Khalafalla Babiker with the Principal of the School of Hygiene in attendance.

Of the 10 entrants 7 passed the examination, they were :—

(1) Ahmed Ibrahim Babiker.

(2) Fathi Yousif Khalifa.

(3) Abdel Aal Ahmed Said.

(4) Mahmoud Abdel Aziz.

(5) Mahmoud Abdel Rahman.

(6) El Harith Mohd. Mohd. Kheir.

(7) Hussein Abdel Gader Waziri.

The 3 unsuccessful entrants have been referred for a period of 3 months to be examined on 11th., 12th., 13th. and 14th. July, 1959.

Second Year

The terminal examination for the 2nd year was held on 23rd., 24th., 25th. and 26th. February, 1959.

The students took the examination with the result of one failure.

One student attained a pass mark below 60 per cent and has been warned in writing in order to work hard in the final term.

First Year

No intake.

Practical Training

1. The daily practical training is being carried out in Khartoum city and its rural area. 2nd and 3rd year students have specific districts for their daily practical training hours and on Thursdays they do full time inspection and report on sanitary premises and other food preparation places. Water and milk samples from Khartoum Province are handled by the students.

2. Annually, during the school vacation between April and August, the students, after being granted their leaves, were posted to different provinces to work under qualified Public Health staff.

3. Different municipal and rural council meetings are attended by the students as part of training.

Rural areas for mosquito work are visited also by the students.

Courses

30 Police Officer Students have taken a course on Public Health. 15 Prison Officer Students have also taken the same course.

The 3rd year Students spent 12 days on duty at the Malaria Control, Sennar accompanied by the Principal of the School of Hygiene.

Unicef.

The following items have been received from UNICEF :—

(1) One Volkswagen Combi Car.

(2) One Refrigrator " Westinghouse ".

(3) Laboratory Equipment.

General

No approval has been obtained from the Ministry of Finance and Economics for the intake of the new students for two years.

All the staff of the School were sent on duty in the school vacation :

Principal to Equatoria Province.

Asst. Principal to Nyala and Geneina.

Public Health Officer to Wad Medani and Kurmuk.

Clerk to Headquarters.

CHAPTER X

THE GRAPHIC HEALTH MUSEUM

There were no changes of staff during the year.

Revision, keeping up to date, and translation of exhibited material, beside the routine work was carried out satisfactorily. Now the Graphic Museum is engaged in reorganising and translating Nutrition Section, as it is believed to be of vital importance to the layman. Extensive programme of work on outside exhibitions and agricultural shows was carried out. Also photographs were given to Doctors preparing for D.P.H.

The museum contributed to the Health Education Seminar held in Tehran from 28.10.1958 to 9.11.1958. The Assistant Curator of the museum was a member of the of Sudan delegation.

The recorded visits to the museum by the general public during the year were 15,672.

The teaching facilities which the museum affords were taken advantage of by the senior class of Medical Students, Students of the School of Hygiene, Medical Students and by junior hospital staff.

Permanent Exhibitions

The following material was added during the year :—

Photographs	120
Charts	4
Drawings	20
Descriptive Notes	500
Models	—
Specimens	10
Posters	2

The exhibitions now comprise :—

Photographs	2,381
Charts	240
Drawings	286
Posters	17
Descriptive Notes	2,158
Specimens	676
Models	200

Audio Visual Aids Centre

The Assistant Curator, while in England on Study Course, had been given financial approval, and he was authorised to order the equipment necessary for establishing a Visual Aids Centre for Health Education. Now the Centre is furnished with a Cine Camera, Projectors, Tape recorder, as well as other materials necessary for the work. Also a small library was supplied for use by the workers on Health Education Field. Still the Centre lacks equipment to serve the functions for which it had been opened.

Films on Public Health and Science were displayed to the Students of the Senior Class of Medical Students, Students of the School of Hygiene and Medical Students.

A leaflet on flies was published during the year. Others on Bilharzia, Malaria, Nutrition, Child Welfare and Maternity are ready for press.

It is a pleasure to report that the following distinguished persons have visited the museum this year :—

Sir Eric and Lady Fronhli ..	Terms of Service Commission, Khartoum
A. A. Kati	.. Royal College of Surgeons—Dublin—Eire.
Paul Alneany ..	.. UNICEF, Paris (France).
Doreler G. Sicault ..	.. UNICEF, New York.
Stewart Sceiter ..	.. UNICEF, Beirut.
Dr. M. H. Khan ..	.. W.H.O. T.B. Adviser.
Dr. Rushdi El Gabi	.. W.H.O. Arabia.
Dr. Fethi Wali ..	.. Cairo University.
Dr. Ali El Baroudi	.. Cairo University.
W. A. Darity	.. EMRO, W.H.O. Health Education Adviser, Alexandria.
Domer Colven ..	.. American University, Beirut.
G. Y. Komo	.. W.H.O. (Fellow) Nigeria.

Sections of the Museum are :—

1. Malaria
2. Trypanosomiasis
3. Leishmaniasis
4. Syphilis
5. Yaws
6. Relapsing Fever
7. Filariasis
8. Diphtheria
9. Ancylostomiasis
10. Schistosomiasis
11. Madura Disease
12. Nutrition
13. Gonorrhoea
14. Cholera
15. Tetanus
16. Tuberculosis
17. Anthrax
18. Cerebro-Spinal-Meningitis
19. Plague
20. Rabies
21. Leprosy
22. Measles
23. Mumps
24. Yellow Fever
25. Small Pox
26. Chicken Pox
27. Vaccinia
28. Dengue
29. Typhus
30. Quarantine Arrangements
31. Phlebotomus Fever
32. Disinfection Methods
33. Meteorology
34. Water Supply
35. Influenza
36. Pneumonia
37. Dysentery
38. Enteric Fever
39. Maternity and Child Welfare
40. School Medical Service
41. Town Planning
42. Housing
43. Undulent Fever
44. Eye Diseases
45. Medical Entomology
46. Skin Diseases
47. Disposal of Waste Matter
48. Folk Medicine
49. Propaganda
50. Rural Health
51. Hydatid Disease
52. Venomous Snakes
53. Historical Medicine
54. Tumours

CHAPTER XI

METEOROLOGY

The following Table shows the mean of the rainfall recorded in Provincial meteorological stations :—

Province	No. of Stations	Mean Rainfall mms.	Highest Recorded mms.	Lowest Recorded mms.
Bahr El Ghazal	10	1,016	1,457	522
Blue Nile	22	432	981	189
Darfur	12	576	1,367	219
Equatoria	21	1,409	2,174	981
Kassala	17	219	481	17
Khartoum	6	167	304	134
Kordofan	17	416	803	107
Northern	11	28	132	9
Upper Nile	14	741	1,332	451

TABLE I—1958/59

OUT-PATIENTS

NEW CASES BY DISEASES AND TOTAL ATTENDANCES

DISEASE	B. EL GHAZAL	BLUE NILE	DARFUR	EQUATORIA	KASSALA	KHARTOUM	KORDOFAN	NORTHERN	UPPER NILE	TOTAL	
1. Cholera	—	—	—	—	—	—	—	—	—	—	1
2. Plague	—	—	—	—	—	—	—	—	—	—	2
3. Smallpox ...	—	260	15	—	45	13	37	10	—	380	3
4. Typhus	—	—	—	—	—	—	—	—	—	—	4
5. Yellow Fever ...	—	—	—	—	—	—	—	—	—	—	5
6. T.B. Pulmonary	418	1,163	167	333	812	2,290	486	519	691	6,879	6
7. T.B. Non-Pulmonary ...	85	758	144	53	645	397	326	278	913	3,599	7
8. Pneumonia ...	612	24,050	7,710	4,977	3,469	13,413	15,825	10,621	6,746	87,423	8
9. Influenza ...	4,145	2,018	16,479	8,694	2,813	13,406	5,303	17,887	192	70,937	9
10. Other Respiratory Diseases ...	28,499	627,028	120,310	148,320	183,396	256,373	263,473	295,953	72,454	1,995,806	10
11. Cerebro-Spinal Meningitis ...	509	90	16	223	13	32	46	13	237	1,179	11
12. Chicken-pox ...	1,132	4,964	1,476	2,345	1,764	3,896	1,941	2,865	405	20,788	12
13. Diphtheria ...	2	137	19	4	220	324	97	52	4	859	13
14. Encephalitis Lethargica ...	—	—	—	—	—	14	1	—	—	14	14
15. Measles	228	4,027	692	5,882	1,397	2,086	2,614	2,639	999	20,564	15
16. Mumps	30	2,756	1,027	678	1,064	5,617	3,710	4,270	448	19,601	16
17. Poliomyelitis, acute ...	—	22	—	2	—	60	3	5	—	92	17
18. Rheumatism, acute	3,391	3,774	693	298	498	2,507	3,916	2,658	14,216	31,951	18
19. Whooping Cough	20	2,196	1,242	1,106	482	3,952	2,720	8,565	612	20,895	19
20. Dysentery ...	2,786	36,449	14,174	8,920	10,061	24,255	15,057	29,217	25,199	166,118	20
21. Enteric Fever ...	3	139	5	6	52	293	9	127	53	687	21
22. Gastro-enteritis of Children ...	433	48,762	4,581	423	3,504	29,027	14,394	24,845	4,429	130,398	22
23. Undulant Fever	1	43	—	2	23	8	2	4	2	85	23
24. Filariasis ...	47	2	2	1,040	—	—	3	—	31	1,125	24
25. Leishmaniasis ...	—	4,510	6	159	569	65	47	3	3,055	8,414	25
26. Malaria	17,025	96,404	47,990	86,458	56,914	21,078	144,485	15,923	30,136	516,413	26
27. Blackwater Fever	1	—	—	1	—	—	—	—	—	2	27
28. Onchocerciasis ...	249	—	2	—	6	1	—	—	—	258	28
29. Phlebotomus Fever... ...	—	—	—	—	—	—	—	—	—	—	29
30. Relapsing Fever	—	—	—	—	—	—	—	—	—	—	30
31. Trypanosomiasis	—	—	—	169	—	—	—	—	—	169	31
32. Ancylostomiasis	1,714	46	377	7,687	9	8	13	126	70	10,050	32
33. Dracontiasis ...	1,208	178	544	1,710	14	68	417	—	353	4,492	33
34. Schistosomiasis ...	423	12,524	3,545	4,619	271	4,328	13,592	5,729	63	45,094	34
35. Gonorrhoea ...	3,062	7,895	19,721	7,307	4,838	6,413	10,482	1,827	5,516	67,061	35
36. Soft Sore ...	43	373	1,238	1,001	386	195	918	20	270	4,444	36
37. Syphilis ...	7,315	12,169	40,145	12,089	8,912	10,250	27,071	3,543	24,865	146,359	37
38. Yaws	8,897	6	—	17,696	3	—	7	2	15,196	41,807	38
39. Anthrax ...	—	—	—	32	60	13	1	—	26	132	39
40. Hydrophobia, human ...	1	5	7	2	1	2	9	4	—	31	40
41. Leprosy ...	107	217	28	877	2	94	36	9	97	1,467	41
42. Madura Disease	—	424	37	1	128	1,751	55	670	—	3,066	42
43. Tetanus ...	6	93	12	24	10	18	17	18	10	208	43
44. Heat Stroke Syndrome ...	—	—	—	—	18	1	—	5	—	24	44
45. Confinements ...	384	1,435	681	515	570	1,108	2,473	359	125	7,650	45
46. Gynaecological...	421	21,505	8,293	225	6,993	10,939	12,717	6,078	508	67,679	46
47. Diseases of Pregnancy and Parturition ...	104	2,677	1,824	341	6	6,443	6,890	2,050	—	22,335	47
48. Puerperal Fever	4	94	20	—	19	51	131	150	2	471	48
49. Wounds and Injuries ...	46,960	481,793	136,285	179,837	161,451	235,113	240,125	182,932	112,842	1,777,338	49
50. Tropical Ulcer	4,332	1,160	6,029	14,147	677	26	12,946	11	8,130	47,458	50
51. Diabetes ...	15	331	46	7	357	2,417	604	513	95	4,385	51
52. Pellagra... ...	—	30	—	1	—	7	2	—	280	320	52
53. Scurvy	8	805	188	13	930	20	698	127	21	2,810	53
54. Neoplasms, Malignant ...	8	106	147	18	40	179	263	42	76	879	54
55. Neoplasms, Non-Malignant ...	83	7,000	577	42	590	1,317	205	37	219	10,070	55
56. Trachoma ...	136	69,458	8,963	1,057	9,861	42,462	11,802	125,078	5,240	274,057	56
57. All other eye diseases ...	17,764	474,071	74,468	63,639	112,957	334,842	134,943	148,035	69,963	1,430,682	57
58. Ear diseases ...	6,546	97,762	20,587	16,247	28,001	52,468	43,956	44,923	49,131	359,621	58
59. Skin diseases ...	10,866	49,597	31,374	43,739	15,126	27,007	39,189	23,952	30,134	270,984	59
60. Alimentary diseases ...	31,065	699,262	145,377	139,435	196,019	264,790	284,537	287,825	75,743	2,126,053	60
61. Circulatory diseases ...	105	55,928	6,669	251	12,809	33,758	18,921	21,023	4,503	153,967	61
62. Genito-Urinary diseases ...	1,621	87,936	21,175	2,753	15,341	43,721	32,079	39,738	5,452	250,716	62
63. Organic Nervous diseases ...	7	1,850	489	6	560	2,342	8,377	5,087	834	19,552	63
64. Functional Nervous diseases	200	1,942	19	27	—	423	2,254	9,231	—	14,096	64
65. Fever of Uncertain origin ...	19,468	18,744	16,208	58,530	12,701	89,566	17,076	31,195	62,223	325,711	65
66. All other Conditions	39,623	419,314	69,456	132,004	94,916	165,085	122,010	104,340	70,725	1,226,473	66
67. Poisoning ...	—	214	92	—	—	339	26	1,184	—	1,855	67
Total new cases ...	262,112	3,386,496	831,371	975,972	954,323	1,718,671	1,520,237	1,462,317	712,534	11,824,033	
ATTENDANCES :											
MEN	319,854	2,100,396	509,227	748,843	995,572	1,170,455	1,065,612	856,223	403,336	8,231,641	
WOMEN ...	200,940	1,693,182	421,361	444,604	443,033	1,140,506	889,258	1,078,337	268,518	6,641,862	
CHILDREN ...	221,049	2,852,081	547,124	549,770	710,807	1,181,491	1,380,441	1,734,689	382,404	9,621,979	
Total Attendances ...	741,843	6,645,659	1,477,712	1,743,217	2,149,412	3,492,452	3,335,311	3,669,249	1,054,258	24,495,482	
MISSIONS	—	—	—	—	—	64,302	170,257	—	186,369	234,559	
Grand Total	741,843	6,645,659	1,477,712	1,743,217	2,149,412	3,556,754	3,505,568	3,669,249	1,240,627	24,730,041	

(d) PREVENTIVE MEDICINE

1. Insect Borne Diseases

(i) **Malaria** : This disease is one of the major Public Health Problems. The yearly figures fluctuate according to rainfall. Adult mosquito control with Gammaxane spraying is gradually being expanded in all Provinces. Larval control is being effected in big towns with gardens and Agricultural Schemes.

Following tables gives figures for cases and control activities.

MALARIA INCIDENCE 1958/59

Year	Bahr El Ghazal			Blue Nile			Darfur			Equatoria			Kassala			Khartoum			Kordofan			Northern			Upper Nile		
	Cases	D	Mean Rainfall mm	Cases *	D *	Mean Rainfall mm	Cases	D	Mean Rainfall mm	Cases	D	Mean Rainfall mm	Cases	D	Mean Rainfall mm	Cases	D	Mean Rainfall mm	Cases	D	Mean Rainfall mm	Cases	D	Mean Rainfall mm	Cases	D	Mean Rain fall mm
1954/55 ...	12,952	33	1,023	105,589	38	481	45,927	18	614	56,617	135	1,115	44,586	29	156	16,001	10	247	113,105	61	604	16,017	—	50	28,492	13	898
1955/56 ...	10,945	19	1,013	85,771	59	407	26,607	24	510	37,203	93	1,320	33,933	23	257	15,513	2	174	100,504	36	456	13,651	4	15	28,667	1	865
1956/57 ...	15,890	78	1,167	116,925	48	538	59,134	5	716	47,737	137	1,546	57,510	29	304	19,296	3	264	146,698	55	683	16,115	9	70	26,645	29	979
1957/58 ...	14,762	34	877	79,017	69	426	31,689	8	513	50,782	99	1,238	43,542	23	293	13,701	8	235	91,048	49	528	20,422	5	54	24,993	26	793
1958/59 ...	17,025	44	1,016	96,404	45	432	47,990	19	576	86,458	145	1,409	56,914	28	219	21,078	8	167	144,485	51	416	15,923	3	28	30,136	10	741

*Figures include Gezira Irrigated Area.

Separate Figures are reproduced hereunder for the Gezira Irrigated Area which shows effect of spraying where accessability of villages for periodical spraying is available :

Year	No. of Cases Diagnosed as Malaria	Recorded Rainfall
1954/55	4,781	393 mm
1955/56	1,614	271.6 mm
1956/57	1,133	442.0 mm
1957/58	1,054	271.9 mm
1958/59	2,899	439.6 mm

The number of rooms sprayed in Gezira Irrigated Area was	579,075
The number of rooms sprayed in Managil Area was	57,985
The number of villages sprayed including Managil Area was	1,202
The total amount of Gammaxane or D.D.T. for spraying—LB	205,064
The total population of Gezira Irrigated (including Managil)	645,280

SPRAYING ACTIVITY IN THE WHOLE COUNTRY

Province	Provisional Census	No. of Population Proteeted	No. of Rooms etc. Sprayed	Amount of Insecticides Used LB.
Bahr El Ghazal	1,150,000	53,253	43,334	138,554
Blue Nile	2,290,000	1,691,536	927,146	342,155
Darfur	1,458,000	121,491	100,182	40,041
Equatoria	991,000	61,965	55,244	27,771
Kassala	1,025,000	190,197	136,830	88,598
Khartoum	558,000	504,923	123,507	46,090
Kordofan	1,959,000	460,903	350,549	143,212
Northern	968,000	435,831	372,668	219,838
Upper Nile	991,000	52,050	34,814	10,797
Total	11,390,000	3,572,149	2,144,274	1,057,056